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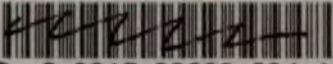
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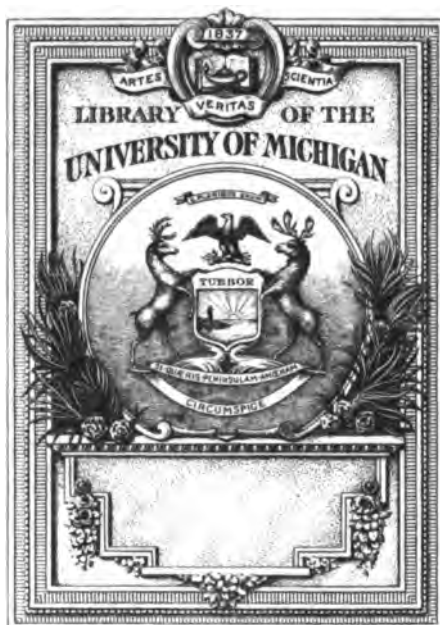
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THE JOURNAL OF  
**Balneology and Climatology**

*Being the Quarterly Journal of the British Balneological  
and Climatological Society*



EDITED BY  
**LEONARD WILLIAMS, M.D.**  
AND  
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VOL. V.

JANUARY, 1901.

NO. I.

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BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL  
SOCIETY.

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PRESIDENTIAL ADDRESS.<sup>1</sup>

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POINTS IN THE DEVELOPMENT OF SEASIDE  
TOWNS.

BY F. BAGSHAWE, M.D., F.R.C.P., J.P. (ST. LEONARDS-ON-SEA).

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ARRIVING, as we are, towards the closing months of the nineteenth century, it will, perhaps, be permissible to take note of the past from the point of view which engages the operations of our Society.

Our Association, for the study and diffusion of knowledge on balneology and climatology, cannot yet claim to have been in existence for a decade, and yet its subjects are not new. Like other medical societies formed during the century, it seems rather to be the offspring of the Royal Medical and Chirurgical Society by a process of fission and division.

As pathology, obstetrics and gynaecology have each found their more restricted paths cut out for them, so has, at length, the study of baths and climates.

Probably the direct impetus to the formation of our body,

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<sup>1</sup> Delivered before the British Balneological and Climatological Society, October 31, 1900.

consciously or unconsciously, was the resolve of the Royal Medical and Chirurgical Society to form a Committee of enquiry in 1889, at the instance of Sir Edward Sieveking, our President.

However this may be, it is clear that opinion had been widely formed in favour of acquiring some more definite knowledge than had previously been attainable as to the health resorts and baths available in this country for the use of our fellow countrymen. Hitherto such knowledge had been in a fluid and undefined state.

Men in London and the great centres of population were in possession of no avenue of information beyond that acquired by general and colloquial sources, or scattered through pamphlets and monographs little accessible. On the other hand, the body of the profession spread throughout the various resorts and baths, had no central means of conveying to one another and to the profession at large the varied attractions and uses of the places in which their lot was cast, no means of comparing their experiences, and no central ground of meeting for conference and exposition. It was time such men were drawn together by such a bond as this Society was to afford.

The profession in London carried out their part by the inauguration of a painstaking enquiry, bringing together a mass of information deserving of the highest commendation. Their work on the "Climate and Baths of Great Britain," extending, it is true, over but a limited area, forms the first part of an enquiry which, for its careful and laborious collection of facts and for the number of its contributors, can only be compared to a Royal Commission, forming a most valuable basis of knowledge to all interested in similar enquiry. It would not be an unsuitable object for this Society to extend this investigation beyond the limits undertaken by the Royal Medical and Chirurgical Society, and to embrace those portions of the United Kingdom not hitherto dealt with, and perhaps to extend it to still larger fields.

The creation and development of seaside watering places in this country has been very much the work of the present

century. In earlier days the leisured classes seeking health or recreation away from the metropolis turned their steps to the inland spas and baths, such as those of Tunbridge Wells and Bath, as the Roman patricians in the olden days had done before them.

Perhaps in this country we may point to royalty as having given the first impetus toward seaside stations. The Georges frequented Weymouth or Brighton, and doubtless set a fashion destined to be widely followed.

An old periodical entitled *The Universal Magazine of Knowledge and Pleasure*, dated March, 1760, speaking of Hastings, writes : " It having been for several years past the custom of many of the Nobility and Gentry of the Kingdom to retire during a good part of the summer season, partly for the sake of health and partly of amusement, to several different places on the sea coast, it is somewhat surprising that one particular town on the southern coast of this island, which appeareth to enjoy many advantages and conveniences beyond other places so situated, hath hitherto been but little frequented on these occasions. The Town I mean is that of Hastings, in Sussex, the place which seemeth, as it were, naturally fitted for the reception of such company as are disposed by either of the above-mentioned motives to spend any of their time on the sea coast." Then follows an excellent description of the situation and advantages of the town (including its " card assembly,") and showing it " to enjoy the whole warmth of the sun, and to be effectually sheltered from the violence of the colder winds, circumstances that render it, perhaps, the warmest situation of any in this island, and, consequently, the most proper habitation of the tender and valetudinary in general, and more especially for such as are disposed to pulmonary consumptions."

Instead of the narrow stream of visitors which flowed from the centre to the circumference of our Island in those early days (by stage coach or post carriage or by new made railways), the mighty stream now flows fast and strong, leading the population from the crowded towns to the sea, whether it be for the enjoyment of the fleeting pleasures of a few short hours, or for a prolonged stay of weeks or months.

Fresh air, fresh sounds, fresh sights, repose, refreshment and exhilaration are thus within the reach of all who seek recreation or restoration to health.

Sir Hermann Weber, in his interesting address to this Society, enumerates a large number of marine resorts girding our islands, and speaking of our climate, goes on to declare his belief that "there is no country in or out of Europe which can compete with Great Britain during summer and autumn, and that even during winter several English sea coast places offer, at all events to some constitutions, advantages over continental resorts."

Such amplitude of marine stations, so fitted to renew health and vigour, have been the outcome of the people's needs developed during the outgoing century, and are doubtless destined to play no unimportant part in the country's future life.

Many a watering place owes its origin to its picturesque surroundings, to the famed recovery of some illustrious visitor, to railway extension, or to its special meteorological advantages, its sheltered climate, or its bracing air. The attention of the public becomes focussed on some secluded village, and within a few years that village has grown into a town, with its terraces of handsome houses, its well appointed hotels and its sanatoria. The importance of superintending the water supply and the sanitation of these growing towns, of providing them with the most approved system of drainage cannot be over-estimated.

In the early days of watering places, when sanitation was little understood and requirements were few, the house drain, if it had one, was built of brick, unjointed and uncemented, the well hard by supplied the water, or some spring as highly reputed as the Highgate pump provided for the fastidious. By degrees sanitary considerations forced themselves upon the notice of seaside authorities, and many towns were subject to rude awakenings as to their importance. To quote an instance. At the Bolton Congress Mr. Railston Brown mentioned that of Bridlington Quay, where eighty cases of typhoid fever had occurred, and where there was the con-

junction of bad drainage and shallow 10 ft. wells. For three months after water was obtained from deep 76ft. wells sunk in the chalk there were no cases of typhoid. My friend, the late Mr. Gabb, bore similar testimony with regard to Hastings. He informed me that in 1857 there was a very dry spring and summer, and then occurred a serious epidemic of typhoid. This, he said, was in the days of cesspools, and before the main drainage scheme had been carried out or an efficient supply of water provided. In some streets of the old town not many houses escaped without one or more of their inhabitants being stricken. I had, he said, on my list at once thirty-seven cases in various stages of the complaint. Soon afterwards the main drainage was carried out, when a wonderful improvement took place in the sanitary condition of the borough. At the present day I may add typhoid is a rare disease, and invariably traceable to its origin, imported or otherwise.

Here then are the problems to be met in such a town as that of Hastings. Formerly a small place nestling between its two hills east and west, it has developed in the course of the century to one of 73,000 people, subject to large influxes of population in excess.

How are its sanitary requirements to be met? That they have been met effectually it is only needful to say the annual death-rate, which compares favourably with other towns, according to latest reports is only 14 per mille including all visitors.

In our borough, as has been stated, main sewers were constructed more than forty years ago, with outfalls into the sea beyond the limits of the town east and west, so arranged as to avail themselves of the ebb and flood tide to carry away the effluent. Such drains are the constant care of the Sanitary Committee of the Town Council, and require the watchful vigilance of that body, aided and advised by a highly qualified engineer to keep them in a state of efficiency equal to the requirements of the increasing population. It is easy to conceive that such a work needs not only enlightened supervision, but a large and competent staff to carry it out.

Highly trained inspectors acting directly under the Medical Officer of Health, a man of high attainment and assiduity, supervise the four sanitary districts of the borough and search into and report on the individual housedrains, taking care that the stringent bye-laws and various Health Acts relating thereto are effectively carried out. (Sanitary Certificates are granted to householders who can pass the required regulations.)

In order to have full control of the drainage system it was found necessary to extend the borough limits so as to embrace the whole watershed area and place all the drains and outfalls under the same supervision. This has proved a most salutary amendment.

Like Hastings, almost all our coast towns discharge their sewage into the sea, the natural and obvious destination for it, and by the water-carriage system.

However, it did not take long to discover that carefully devised methods had to be adopted to avoid inconvenience from direct outfalls even when these outfalls were carried below low water mark, and full account was taken of the tidal influence in carrying off the drainage.

Whether the coast land be flat or hilly with intersecting valleys and chines the effect is the same. Intercepting low level drains have been mostly found requisite to ensure conveyance beyond the limits of the towns in question. Some work continuously, others use intercepting sewers and tanks, so as to be able to ensure that the outfall shall take place at the proper state of the tide.

Again, on a long level frontage another difficulty may arise. To obtain fall sufficient where the level of the drain is so low that the sea outfall becomes embarrassed, an ingenious method (the shone system) has been adopted, similar to that made use of by the miner. By means of steam power a force pump causes compressed air pressure which works automatically to lift successive portions of sewage from a tank to the higher level of the outfall.

On referring to the methods employed in thirteen important south coast towns I find that six have one or more direct outfalls, seven have intercepting sewers and distant outfalls,

of these three have separate stormwater outfalls, while a few are supplemented by cesspools.

But the close aggregation of towns around our coasts in certain parts must lead before long to considerable difficulty in the disposal of sewage ; and there is reason to fear lest the sewage discharged from one town may cause nuisance by being carried by the set of the tide, and deposited along the shore of a neighbouring town. To remedy this either some joint scheme must be hit upon by contiguous towns, by which this danger shall be obviated, or, what is preferable, some means must be adopted by which the solid parts of the sewage can be reduced and the effluent rendered innocuous. Of the various plans of sewage treatment hitherto in vogue a large number, aimed at the precipitation of the solid matter in suspension by the addition of chemicals, the resultant sludge being then submitted to pressure, and when dry disposed of as manure. But this is a costly process, involving constant expenditure for chemicals, and requiring expensive machinery and a large staff of men, and when all is done there is little demand for the pressed sludge and a very small money return, indeed the cake is practically valueless owing to nearly all of the nitrogenous matter having been washed out.

Admirably adapted as sewage farms may be to many inland towns, they must remain an impossibility for most seaside resorts owing to low levels, and the want of available lands.

The bacterial system, after much enquiry and debate, seems to have established itself firmly in the valleys of the Thames and Exe and in other parts, and to be receiving recognition financially and otherwise from the Local Government Board. The great principle has been evolved that the rapid splitting up of the organic compounds in the sewage matters passing through the filters is due to the activity of the large number of micro-organisms therein contained. The change is no longer accounted for as being a purely chemical or mechanical process.

It has further been found that bacteria work their ends under two conditions :—

- (1) In the closed tanks or anaerobic beds.
- (2) In the open or aerobic beds.

In the anaerobic beds the sewage first flows through small tanks for the removal of sand or coarse and accidental substances, and then passes on to the large enclosed anaerobic tank where it lies at rest. Here it is found that the solids break up and liquefy, the more heavy material sinking at first until in process of time it is acted upon, while a leathery scum from two to six inches thick collects on the surface densely packed with micro-organisms. Below is a zone of fermentation in which the sewage is mainly clear, while bubbles of gas keep the fluid in a state of quiet admixture. At the bottom of the tank is a layer of dark peaty matter, which is so small in amount that during a year's working it does not require to be removed. The organic matter in it is gradually broken up by the bacteria, the inorganic matter is raised by the gases and gradually carried off in the flow, so that its quantity does not sensibly increase. Such is the description of the Septic Tank at Exeter as given by Mr. Cameron, the City Surveyor. The tank is of capacity to contain one day's sewage, and the flow is continuous through it. On leaving the closed tank the effluent is treated in the aerobic beds.

The aerobic system does not rely upon septic tanks, but is found to work most conveniently and effectively with them. The sewage in this system is distributed through open channels over beds of coarse and then fine coke breeze, the meshes of which are known to be charged with aerobic bacteria. Alternate beds are employed so that each shall be used intermittently. During the period of rest these bacteria take up oxygen from the atmosphere and resume their power of acting upon and nitrifying fresh portions of sewage brought in contact with them. Thus employed the alternating beds continue to carry on their work for weeks together without becoming clogged. The effluent from these beds is found to be clear, pure and inodorous, and leaves hardly any sediment after long standing. This system is worked with great success and on a large scale at Hampton, at Sutton, and has been already introduced at many other places.

Mr. Cameron carefully differentiates between the hydrolytic or solution process as carried on by the anaerobic

bacteria in the septic tank, and the subsequent oxidation required for final purification, as carried on in the aerobic beds. By such processes as these we have a method at hand to obviate danger from the discharge of crude sewage on to the foreshore, there to run the risk of its being returned by the tide.

Sea-water, writes Dr. Rideal, to whose work I am indebted, is not a satisfactory medium for the purification of sewage, partly because it contains a comparatively small number of water bacteria, but mainly because the tidal disturbances prevent sedimentation of the suspended organic matter, which allows, as we have seen, the organisms which live in the absence of air and light to do their necessary work.

It is of interest to enquire to what extent the bacterial treatment of sewage destroys any pathogenic germs which may be present therein. The question is one of practical importance, in view of the fact that effluent from the sewers of many seaside towns is discharged in close proximity to beds of oysters and other shell-fish, which thus become liable to pollution. The shell-fish therein gathered are capable of retaining this specific organism of enteric fever in an active state (according to Foote) for a month at a time, and the consumption of such contaminated articles of diet in an uncooked condition may give rise to outbreaks of fever, and bring groundless suspicion on the sanitation of health resorts.

Dr. Newsholme, of Brighton, states that in the year 1899 he attributes 52 among 137 notified cases of typhoid fever to the eating of such shell-fish, or 37 per cent. of the whole number reported, while reports to a similar effect issue from many other quarters.

It may first be remarked that the processes above described are similar to those which obtain in the sewage farm, effluents from which are strictly comparable to those from anaerobic and aerobic beds. Treatment in such farms has been shown not to lead to danger in this direction, the bacillus of typhoid being rapidly annihilated, whereas in a sterile soil it may live for weeks.

Further, it has been shown by Lawes and Andrews that

some liquefying organisms have a germicidal effect upon typhoid bacilli, so that their sojourn in a septic tank, or their arrest in an anaerobic filter with such organism diminishes instead of increases their chance of survival. Dr. Pickard, of Exeter, has proved this fact again experimentally by introducing an emulsion of the typhoid bacilli into a septic tank, where he found that, instead of increasing, they rapidly diminished, until after fourteen days less than 1 per cent. of the number introduced were surviving. He further showed that the filtration as conducted at Exeter, removed about 90 per cent. of the typhoid bacilli inoculated with that organism.

The first seaside place to adopt this method on a large scale has been Morecambe, five miles from Lancaster. This town, situated on the southern side of the Bay, and opposite to Grange-upon-Sands, is placed in a difficulty as to its sewage disposal owing to the shallows and sand banks and to the deficient tideway. Moreover, its natural drainage outfall lies to the inner part of the Bay. The drainage, therefore, tends to return upon the town. To meet this it has become necessary to deal with the sewage so as to dispose of the solids and allow only of a purified effluent escaping into the sea. It is essential, in fact, to act as in the case of an inland town where only a clarified outflow must be discharged into its adjoining river. It has been found that the bacterial system best meets this requirement, commencing with the tank system alone; while provision is made for adding the aerobic beds if needed.

The disposal of house refuse has exercised many a growing town. The dust-yard stands condemned. It is sufficient to say that the use of the destructor, brought up to date so as to consume its own smoke and effluvium by the high temperature chamber, has solved the difficulty in a satisfactory way.

Every town of any size or importance must have its own history on the water supply question. Its gradual development from the time when it relied on pumps and springs, its storage reservoirs, perhaps from streams and surface water, until at length it has been forced to seek supply from distant and deep wells to find an adequate quantity and quality of water, fill the records of its Water Committee. It might be of

interest to recount some of the struggles and difficulties which towns have had to face to bring or to maintain their water supply up to a proper standard. Illustrations of such struggles have been familiar in such instances as at Worthing, Maidstone and Caterham, and in a different way at Eastbourne. In each case the mischief was traced to its source and speedily remedied by the energy of the Local Authorities.

Judging by the reports available most of the larger south coast towns have been able to procure supplies from deep wells and borings, well removed from the populated districts, and it is of interest to note that a large proportion of these are derived from chalk formations. It does not appear that the removable or fixed hardness of these waters has an injurious effect on public health. Calculus diseases are seldom reported to be prevalent.

The incidence of anæmia at the seaside is one of the points on which enquiry was made by the Medical Chirurgical Society. In summarising his investigations as to the climate of Cornwall, Dr. Dickinson calls attention to the anæmic appearance of the inhabitants of the Scilly Islands, and says, "this appears to be a marked instance of marine cachexia." "The superabundant moisture of the air, and its conspicuously relaxing effect may assist in producing this state." Many observers along the south-west coast and in the Channel Islands appear to have noticed the frequency of its occurrence, as for instance, Dr. Montgomery at Penzance, and Dr. Stone in the damp climate of Dartmoor. Further we learn that on the northern coast of Cornwall as well as on the eastern half of the south coast no undue amount of anæmia is found. Considering the evidence available I am led to think that marine influence has not so much to do with its causation as dampness and relaxing condition.

Dr. Collier, of Oxford, thinks that in the low-lying valley of the Thames and in the few districts of Cambridge and Lincolnshire we get a heavier percentage of anæmia than anywhere else in England. A similar experience of frequency comes from the valley of the Derwent at Derby. Anæmia is of common occurrence in hospital practice in Hastings, that

is, among the servant class and shop girls, who live chiefly in ill-ventilated basements, super-heated, often damp and sunless, perhaps with a slender and impoverished diet. But I am unable to trace it to sea influences. The muscular system becomes relaxed; the heart and stomach give way, especially under the strain of heavy lifting up many stairs, and many advanced cases are little amenable to treatment short of rest in bed and careful good feeding. It does not appear that anæmia is more prevalent among the resident upper classes at the seaside than elsewhere at inland places. Certainly those who go seawards to recover under good conditions of repose and fresh air make rapid progress. This seems to be the usual experience at all stations, especially at the drier and more bracing ones.

Following in the steps of the enquiry on *Climates and Baths of England*, it would not be difficult to compare the statistics of our health stations with those of inland towns, and with one another with regard to zymotic disease. But such comparison is needless. It is sufficient to have ground for the assurance that such accidental and preventible disease is reduced in our stations to a low figure, thanks to the high standard of sanitation provided for by our Public Health Acts, and to the assiduity with which those provisions are now carried out.

Accidental disease has a way of declaring itself, and the public press has a habit of speaking out, while the medical profession is in the forefront of keeping an eye on such knowledge. Now I would venture to advocate that from the ranks of our body should be found men to serve on the Local Sanitary authority who will prove able coadjutors, if not leaders, in devising and carrying out all needful measures affecting public health. It is not enough that they should look on, and, perhaps, criticise the work of others, they should themselves take up their part as citizens and give their store of skilled co-operation in working for the public weal. In health resorts especially I would contend for an infusion of the medical element into all such municipalities or Boards of Health, and especially on the sanitary committee. By this

means members of the medical profession can, outside their ordinary practice, render valuable aid to the community.

It may be urged, of course, that the medical officer of health can do all that is requisite, but this is far from being the case. The medical officer of health is there, it is true, to give advice on all subjects connected with the public health, but there is much more than advice required. There is need of some one on the Council itself to see that the advice is followed and the suggestion acted upon. The medical officer of health can report upon matters requiring attention, but unless he can find some one in the confidence of the local authority to give him effective support, his reports are likely to remain a dead letter, and such support to be effective must come from within the Council itself. The influence which can be brought to bear from without—as by medical societies and other associations—is not to be compared in efficiency with that of even a single enlightened member within the municipal body itself. Such an one can keep constantly before the eyes of the governing body the high ideals of sanitation which are so essential to the healthy development of a growing town; can lay stress on the need for the adoption of stringent building bye-laws; and can see that the larger questions of water supply, main drainage, sewage disposal, refuse destruction, and infectious hospitals are adequately dealt with.

Instances without number might be cited where, through lack of such supervision, public moneys were frittered away in temporising in sanitary matters where sweeping reforms were needed to avert disaster, or enormous risks were run to avoid a small immediate outlay. This opinion is strongly held by our own medical officer of health; and I am glad to have been confirmed in it by Dr. Latter of Folkestone, who gave us an interesting paper on the “Duties of Medical Men in the Life of Health Resorts,” in the discussion of which many present may have taken part.

As an example of such utility I may instance the question of hospitals for infectious diseases. Without the presence of such medical representation the provision for the sick runs the risk of being inefficient and slipshod owing to the want

of familiarity with the importance of the subject; whereas with it—and speaking with the authority which a medical man carries in the Councils—the organisation and equipment of an infectious hospital becomes an established fact. Again, in case of sudden emergency or danger, it is to the medical members that the authority looks for guidance and help and work, where others shrink from the unwelcome task.

The public patronage of a modern watering place depends not only on its sanitary repute, which is naturally supposed to be unexceptionable. It expects that all the amenities of life shall be found among us; good roads, good lighting, effective police regulations and the rest. Sir Hermann Weber has well pointed out what are some of the needs of our English watering places, which, as he allows, provide climates among “the most health-giving in the world.” For, he says, “they produce the finest animals, the finest trees, the finest men and women, and are most conducive to health and longevity.”

Of late years our larger coast towns have vied with one another in constructing fine parades, adapted to smooth and easy locomotion, studded with shelters suited to give protection against all winds, and enlivened by shrubs and flowers.

Gardens and parks are maintained in a high state of culture and beauty, and are provided in some places with their winter gardens.

Not a few towns have laid themselves heavily under contribution to provide music on their public parades, and so to contribute to the enjoyment of their visitors; while museums and public libraries provide congenial occupations to the more studious.

It is in such directions as these that the authorities responsible for the management of our health resorts and baths have striven to fulfil the task imposed on them, and with what success they must leave the public to judge.

It may, perhaps, be safely claimed that in matters of sanitation our towns compare favourably with foreign stations, many of which have been induced to follow our lead in sanitary instalments, and not before the occurrence of accidental illness has impelled them in that direction.

English watering places have not been behindhand in constructing and embellishing such buildings and baths as shall be worthy of the reputation they aspire to, and conducive not only to health but to the enjoyment of the community, always endeavouring to learn from the experience of others, and pushing forward to the fulfilment of the highest ideals.

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## THE SUPPRESSION OF MALARIA.

BY ARTHUR R. WADDELL, M.D., C.M. (POTTERS BAR).

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GENTLEMEN,—In selecting as the title of my paper the term "Suppression of Malaria," I know that I am contemplating a very big contingency—a contingency bigger and more distant than the knowledge and means at our disposal enable us to measure for the time being. All the same, our subject, in view of the discoveries of Ross in Calcutta following on the brilliant deduction of our countryman Manson, and so ably supplemented by the Italians, deals with a problem which is amongst the most important occurring in the history of the human race. It is undoubtedly the question of the hour.

How vast and pressing it is becomes manifest when we reflect upon the wide extent of our world which is dominated by malaria, which practically exists continuously round the globe wherever certain special mosquitoes occur, and wherever the mean summer temperature does not fall below 62° F.; wherever, indeed, inside this wide zone Nature is most prodigal in the provision of breeding conditions for mosquitoes, and wherever man, in his environment, is least controllable, there it is rampant and opposes the greatest difficulties against its subjection.

Desirable, therefore, as is the goal we have set ourselves of ultimate total suppression, all that we can hope for in the meantime is to reach this in certain favourable localities only; outside those we must be content, for a long time to come, with securing some sensible diminution of the plague.

Our first consideration must be the nature of the task which presents itself and the means at our disposal to deal with it. When we have gone into these we will have to consider what, amongst the varied propositions, is most capable of practical application.

We may start, for the purposes of this paper, with an acceptance of the theory that in the case of man mosquitoes of the genus *Anopheles* are the carriers of the three forms of malarial parasites known to us, and that, through their agency alone, in conjunction with the victim man, the vicious circle necessary for the preservation of the parasite species is secured. We knew, indeed, years ago that the tertians, quartans and æstivo-autumnal fevers were due to the presence in the human blood of hæmo-sporidia with a special form for each, but it was Ross's discovery which capped our knowledge of the life history of these, and demonstrated that the asexual phase or generation in the human body alternated with a sexual phase or generation in that of the mosquito; in other words, that the link of malarial hæmo-sporidium life lay between man and the mosquito, and that in the breaking of that link was to be secured for man the destruction of the hæmo-sporidium species and consequently the cutting off of malaria.

We know that while man may be infected from his fellow by direct inoculation, the contingency is so remote, except by an occasional hypodermic needle possibly, that we may leave this mode of infection out of consideration. And we also know that one mosquito does not infect another, nor a mother mosquito the daughter. The one means of communication which we have to consider, therefore, is the proboscis of the female anopheles, which hence may be regarded as the pipe by which the whole of the mischief is received and transmitted.

"No man no malaria no mosquito no malaria" has become an axiom, the terms of which are of great force. But we can go further and say boldly, "No completion of the alternating generation of the hæmo-sporidium, disappearance of malaria." How is that to be accomplished? By quarantining infected and suspected man, in the first instance, and by keeping anopheles away from man in general, in the second.

Here, in plain terms, is the enunciation of our task. Before proceeding to consider it in detail, let us take a little comfort from the consideration that in aiming at keeping man' and

anopheles apart, whatever advantage we secure is progressive, each circle of conquest spontaneously widening so long as our efforts are maintained.

At the outset we may dispose of the will-o'-the-wisp question of hereditary immunity. There is such a thing as racial immunity in degree, acquired by centuries of generations of malarial sorrow and suffering, and there is such a thing as individual immunity in degree, just as there are individuals whom nothing short of exhaustion will apparently kill, but modern malarial hygiene will quickly dilute, if not nullify; the advantages of these.

When we turn to acquired immunity we are on firmer ground. True, quinine, from difficulties connected with its administration, does not seem to assist us much, and euquinine, its equivalent, is still on its trial, but in arsenic and methylene blue we find agents which, although only partially proved, seem to promise a good deal.

We have said that infected and suspected man must be quarantined. They must be treated, whether at the frontier or within a given district, as foci of infection, as if, indeed, they were carriers of the bubonic plague itself, and when their first period of probation has ended they must only be admitted to liberty on parole, as it were, and on condition that they will remain under supervision and conduct themselves with special reference to avoiding the possibility of their being bitten by mosquitoes.

Healthy man, where anopheles exists, must be veiled off from his tormentors during the biting hours, whether he is abroad or in his dwelling, and the latter must be such as can be cleared and kept free from the invasion of mosquitoes. The experiment of Low and Sambon in their protected hut, and the special regulations in this direction carried out by Celli and others in Italy, show us what can be done.

Conditions which mosquitoes object to, such as free circulation of air, abundant sunlight and artificial light, reflecting surfaces, &c., must be invoked. There is reason for believing that the comparative immunity of some cities and towns in dangerous localities can be in part attributed to this light

factor, and it remains to be demonstrated to what extent the introduction of public electric lighting into such a place as Sierra Leone, for instance, is likely to be accompanied with advantage.

If the complete veiling off of man from the mosquito could be absolutely maintained in a given area for a given period, a period exceeding the average life of the mosquito, and there were no fresh importation of infected insects, that district would remain free from malaria. But such a result could only be, at the best, tentative. For a population to slumber in a dream of security while the foe is hovering outside the ramparts of gauze, awaiting only fresh supplies of ammunition to renew the slaughter, were to court disaster in the future. The European epidemics of the nineteenth century and the great outbreak of malignant malaria in Mauritius in 1867 are cases in point, and possibly the great epidemic of sweating sickness which swept over Europe in the middle ages may be another.

This brings us fairly into our second consideration, "the effectual keeping of anopheles away from man," and involves nothing short of the eradication of the *Anopheles* species from the area to be dealt with. In the accomplishment of this we can systematically deprive the mature insect of haunting places, whether domestic or abroad in the wild, and destroy it wherever possible; we can kill off its larvæ, and we can render mosquito reproduction impossible. As she cannot fly far, her haunting place will be found not far away from her breeding place, and in situations where she can obtain shelter during the hybernating season, shade from strong light and protection from storm, rain and cold. This varies with the species; some, as *Maculopennis* (*Claviger*), are domestic and appropriate the advantages presenting themselves in the abodes of man, some, like *Bifurcatus*, seek the umbrageous shelter and dry trunks of the woodland. Cromwell's coarse adage about pulling down the nests and the rooks flying away contains wisdom apposite to this point.

For the destruction of the winged insect, when we can get at her, we have many agencies, the principal of which are

spraying with soap and water, for instance, as we do aphides on roses, or ammonia, fumigation with tobacco, nitre, burning chrysanthemum flowers, &c., the diffusion of certain odours such as of turpentine, and of certain gaseous agencies, such as sulphur dioxide. These are all capable of deadly effect.

Natural enemies of the mosquito, such as particular birds, may be found and fostered, and these latter are likely to prove loyal and increasing allies, for in the case of the culex, as in anopheles, they find the malarial agency affecting their race. The growth of rank vegetation must be avoided, and woods and bush in malarious areas dispensed with. The especial moment for the destruction of the mature insect is when she is hybernating, for then she carries human lives in her girdle, and the possibility of worlds of sorrow in her ovaries. How important this psychological moment is becomes obvious from the computation of Ficalbi that from one mother stem, in four generations, 2,000,000 mosquitos may be born, and in five generations, two milliards.

In turning to the problem of destroying the larvæ, we must take into consideration that while they are essentially aquatic in habit, they are yet air breathing. This gives us a double string to our bow, for while they breathe air by their dorsal tube, they keep up a to-and-fro wash of water in the rectum. We can either smother or poison them. The former we can effect by placing a thin coating of kerosene or fixed oil on the surface of water they swim in so as to exclude air. We can turn them out of their aquatic environment, but this is not in itself an infallible means of destruction, as at a certain stage of their development larvæ and nymphæ can continue to mature to the adult stage without it. We must make sure with poison, for which purpose many agents are suitable—certain vegetable solutions and chemical reagents, especially certain anilines. An ideal larvicide should be such as is capable of wide application, it should be cheap, be in such a form as will permit of easy distribution, a good powder for instance, or something that will work in an apparatus of the extincteur type. It should be non-poisonous in the ordinary sense of the word, and be so stable that it can be

used in advance on likely breeding places, before expected floods and rains, for instance, so as not only to destroy larvæ present, but, by virtue of its qualities of slow solution and specific gravity preventing it from being readily washed out or attenuated, be capable of keeping up its efficacy over a prolonged period—waiting for them, as it were.

The destruction of winged insects and of nymphæ and of larvæ, however, is all very well so far as it goes, but it is an incomplete proposition. There should be no eggs to hatch into larvæ, therefore we must leave no breeding places. The one essential to the breeding of mosquitoes is that the land surface be capable of holding stagnant pools of water, or that the water-courses permit their formation. This reduces the question to one of hydraulics pure and simple, and shows us that the covered drain and the protected water course and water area are the keys to the situation.

England and Rome each afford us a valuable object lesson in this respect. Although up to the present century malaria has abounded with us, our good drainage has practically abolished it; while Rome, during the Empire, was almost freed from trouble by the great work of the Cloaca Maxima draining the subsoil waters. Even some parts of the now pestilential Campagna were at one time rendered habitable by an excellent drainage system, and supported large cities and populations until it was allowed to fall into disrepair.

Having the relationship of mosquitoes (and therefore of malaria) and breeding places in the form of water surfaces thus clear in our minds, we can understand how the question of the subsoil water and the condition of the water courses dominate everything. Speak about subsoil impermeability if you please, it amounts to the same thing, for malaria only occurs where we have this impermeability. Deal with that effectually and correct the open streams, and Homer's envenomed fly, as he called the mosquito, will soar in vain looking for a breeding place.

The hammer and chisel, then, for the rock hollows, the drain pipe covered with porous material up to the level of the impermeable, and smooth sides and uniform currents for the

running streams. If there happen to be water-absorbing strata beneath the impermeable at the surface, such as the chalk beneath the London clay, absorbing wells or openings made into it with dynamite can be created.

There must be no surface oozeings, no places where aquatic weeds can grow, no pools, ponds, backwaters, overflows or leakages, and only those running streams which maintain a certain velocity and the sides of which are smooth and straight, can be permitted above ground. All others must be piped-in or covered over, and if the needs of man and his animals necessitate open water surfaces they must be netted round or kept under systematic inspection against larvæ. Lakes, too, must be properly banked and provision made against overflow; storm waters must be anticipated, as in our townships, and areas, waterlogged by the lowness of their levels, must be kept efficiently pumped clear.

If, as I said before, these conditions are made permanent in any one district, anopheles, and with it malaria, will become extinct.

I would here seek to point out, by way of encouragement, that so numerous are the forces in nature operating for the destruction of the mosquito, that only by an extraordinary fecundity can the race survive. What far-reaching effects must ensue, then, if only our efforts can succeed in reaching the point of balance.

There are two potent local factors in the breeding of mosquitoes which we may here consider, and which, on account of their importance to man, cannot be dispensed with. I allude to rice-fields and broad irrigation.

A typical rice-field, as you may know, is a flat expanse of land which, by means of embankments and a supply of running water, is kept submerged during a great part of the life of the rice plant. These areas become veritable hotbeds for the breeding of mosquitoes. If we are to have rice-fields, and at present we have no alternative, we can control residence within a given distance from them, but this, again, is only a tentative measure. The solution of the crux lies in the provision of a larvicide so cheap as to be miscible freely

in the flowing water, and which will be either innocuous to the rice plant or even beneficial to it. Methylene blue seems to promise much, but the ideal remedy is ammonia, if it can be prepared cheaply enough. Surely our scientific age, which photographs the unseeable and proposes to speak to the spheres without wires, can call from the great atmosphere storehouse the nitrogen we require in order to deliver us from this difficulty. For the more I study the problem, the more I am convinced that the provision of cheap ammonia is more likely to settle the particular difficulty than anything else. The same thing applies to broad irrigation. In this connection I may point out that we must be careful lest, in adopting measures for the relief of man from malaria, we introduce new factors which will destroy him. Broad irrigation in India is a case in point. On a sheet of paper it was all right: it was to save many lives from famine and death, and enrich the community, and it has so far succeeded. But while it has saved man with the right hand it has stabbed him with malaria in the left.

Fortunately, now we know how things are, we can apply some measures of control. Irrigation must be on general principles, the first of which is, that the yield of a country does not depend on the amount of water which is poured on its surface, but on the amount of moist air borne to the roots in a porous soil. To pour water on a soil which is impervious near the surface is to wash away its salts, and in malarious countries to make a nursing ground for mosquitoes.

No irrigation should be permitted where deep drainage has not been provided and the soil rendered porous by cultivation to a fixed depth. If, following on those conditions, we can secure an efficient supervision against the formation or existence of mosquito breeding places, and can provide a cheap and desirable larvicide for the irrigation water, we will have nothing to fear.

These, gentlemen, are the general principles of the question; there are many subsidiary points I might have taken up and amplified had time permitted, but it will be well if we sum up and see where we are.'

We have discussed the temporising expedients of quarantining the sick and veiling the healthy, and the more far-reaching plan of killing the winged insect and destroying its young, and depriving it of breeding ground, and have seen that the latter measure is our true line of defence and defiance.

In this, methylene blue and cheap ammonia, a minute hydraulic survey of each district followed by the pumping engine, the covered drain, the regulated water course and the protected water area, are the hosts upon which we must rely to lead us to victory. It only remains for us to discuss the question of practicability.

In islands and isolated districts, such as Corsica for instance, we can secure an immediate suppression ; even in the peninsula of Italy we can hope for it with a bigger effort.

But when we turn to India with its teeming millions and wide jungles, can we still hope ? I think so !

When, on the other hand, we look at East and West Africa, with its perennial exuberance and the sombre *Anopheles funestus* hatching out in every eddy on the great waterways, our hearts almost fail us. There is, however, no ground or excuse for despair, for we can at least make a beginning, we can widen out from there as a centre, and, above all, we can educate everybody on the subject, and so invoke upon our side the aid of the instinct of self-preservation. The weakest and the foolish will go to the wall as usual, and drag some of the best with them no doubt, but the trend will be upwards, always upwards, although sometimes slowly.

When, again, we look abroad to where nature, chaotic and exuberant, holds sway, and see man abounding and still savage, we hold our breaths and ask ourselves strange questions about the desirability of the preservation of some races. But once more we get our answer of hope and assurance that, when we bring malaria within bounding chains we will see that it was its baneful influence, acting over the centuries, which has weeded out and driven away the energetic and intellectual and left the field to types which, in some cases we know, are but degraded survivals of loftier races.

The question of segregating the controllable from the uncontrollable is one which we must consider very seriously to start with. There are those qualified to speak who advocate it.

Segregation may have its uses, but I fear it, too, is only a temporising expedient. The total clearing of area by area constitutes the only remedy, and when we effect that, colonisation will become possible where it is now impracticable, and the best of the white northern nations will weld their ideas with those of the yellow and the black and lift the mass of humanity.

Of the positive effects of the measures considered, where they can be intelligently applied, there can be no doubt. It is all a matter of economics. If a jury of business men were empanelled to adjudicate on this point the first question they would ask would be, "Will it pay?" and the reply would come back triumphantly, "Yes, pay many times over." For the healthy energy of a country is the true index of its wealth and greatness, and where malaria is, are diminished health and subdued energy. But what, I ask, has the question of pounds and liras and lacs of rupees got to do with malaria suppression when the cause of humanity demands it? If a man's health, life and happiness be placed in one scale of the balance against all the gold of the universe, the diamonds and precious stones of the mine, and the pearls of the sea, will it not weigh them all down? Economics must nevertheless have a certain say, for we must be just as well as generous. Nations must rise to their duty to the best of their ability and be ready to make big sacrifices in the good cause. Many things of the luxurious order can be dispensed with, one, not the least, some portion of the be-tinselled and hysterical militarism which absorbs so many energies. Ross's discovery has come as a fitting crown to a century already glorious in its ending: let us hope that the new century will master the problem which is thus unfolded. Let us hope, too, that our beneficent British Empire, great in the ownership of malarial territory as she is in many virtues, will lead the van in rising to her responsibilities and grappling with this scourge of man.

## DISCUSSION.

The CHAIRMAN said the applause indicated their appreciation of the eloquent paper which they had just heard, and the best satisfaction would be given to the author by at once proceeding to discuss the interesting problems raised. Happily, none of those present were old enough to remember malaria in the London district. When he began his out-patient work in London in the early sixties, he saw, from time to time, a few cases of malarial disease, especially from the Essex marshes, and from Kent, Suffolk, and Lincolnshire. Fortunately, as the years had passed, those cases had become few and far between; and now only those cases which had been imported had been met with. The Society which he represented would be able to supply a great deal of information as to how tropical malaria asserted itself in low-lying parts of England, where, from time to time, tropical malaria was developed, but passed away when the individual was taken to higher ground. There were in England mosquitoes of the dangerous kind, but happily, they had but little opportunity of imbibing that which would cause malaria; so that the danger of acquiring malaria in England by that means was exceedingly small.

He had one interesting fact to communicate on the special subject of the paper. He had lately been seeing an engineer who had travelled much in Brazil, and who had told him (Dr. Symes Thompson) that there were two districts with which he was too familiar. In one of these a river ran along on the same level as the land, and was constantly overflowing its banks, leaving marshy pools on either side in which mosquitoes developed; and in that neighbourhood malaria prevailed. Close at hand, in a similar climate, another river cut its way through a ravine, it never overflowed its banks, there were no pools or lagoons on either side; and there, no dangerous mosquitoes were found and malaria was not prevalent. Thus the weight of argument was supported in an interesting way

by that illustration. Again, when up the Nile, at Luxor and Assouan, he was interested in noting that while malarial affections were not met with on the land, they were encountered on the dahbeas. There was always leakage water in those vessels in which the mosquitoes were propagated; whereas on the land, except in irrigated places, there were no such opportunities. So that whilst malaria was very rarely met with on land, both malaria and mosquitoes were encountered as far down as the First Cataract on board those boats.

Regarding the introduction and importation of mosquitoes into England, he gathered that that was common enough, especially in timber ships. One day, about two years ago, he had a consultation near the river, at Greenhithe, and whilst talking to the doctor about the case the latter suddenly said, "Excuse me," and gave him a pat on the forehead. A mosquito had alighted on his forehead and bitten him, and in a few days he felt the usual discomfort and prominence at the spot.

He did not intend speaking at length at this stage, but would like to hear the opinions of those around him. Possibly, if time permitted, he would speak more fully later.

He was very glad to hear that Mr. Austin, of the British Museum, was present, and the Society would be very glad of a word or two from him.

Mr. AUSTEN (of the British Museum, a member of the Liverpool Malaria Expedition to West Africa) said he rose in obedience to the invitation of the chairman, but he did not know that he had anything very instructing to convey to the Society after the very interesting paper to which he had just listened. At the same time—if he might venture to say so—the author seemed to him to be a little too sanguine in thinking that it was possible to deal with what was, if not the *fons et origo*, the most important part of the whole matter, namely, the mosquito itself. If they had to deal with people of the intelligence of, say, the members of that Society, it would be perfectly easy; but all the while their lives were, so to speak, at the mercy of peasants and black men, *i.e.*, people

of the lower type of intelligence. For that reason he doubted whether it was as easy as the author of the paper had insisted, to deal with the mosquito. They clearly saw last year, at Sierra Leone, that, provided there were efficient supervision and honesty in carrying out the work, it might be possible in the Settlement of Sierra Leone—one of the most malarious places on the West Coast of Africa, and therefore in the world—to exterminate the anopheles by poisoning the water. But the question was, would they ever get it done? At the present moment it was difficult enough to persuade the ordinary thinking Englishman that malaria was due to the mosquito at all, and it was a thousand-fold more difficult so to persuade the black. He treated the whole matter as a joke, as a mad-brained idea emanating from a mad Englishman. He himself was inclined to agree with what Dr. Sambon said the other night—that more was to be done in the way of segregation of European patients, and of providing properly erected houses than in the direction of destroying mosquitoes or their larvæ, although he strongly urged that every effort should be made in this direction. Still, he doubted whether it was possible to do the latter thoroughly. One must always remember that an outbreak of malaria need not necessarily be due to local conditions. In the light of modern discoveries it was evidently perfectly possible for one or two individuals who had been in a malarious district, perhaps hundreds of miles from any particular centre, to bring back the parasite of malaria in their own bodies, and to form the centre of an outbreak of fever which might have very far-reaching results. In that case it would be no protection to drain the marshes for hundreds of miles around, when perhaps people from 500 miles distant had brought the disease. Such a proceeding would of course protect to some extent, but while there were small centres around and water sufficient to hold in one's hand, it would be enough to attract dozens of anopheles, and two or three people carrying malaria in them would be capable of originating a new outbreak if there were only a few mosquitoes in the place. If, however, they could efficiently isolate those people by mosquito-protected

rooms and by mosquito nettings, there would be much greater chance of good results. That was all he wished to say about prophylaxis.

With regard to mosquitoes in this country, there were at least seventeen or eighteen species which were indigenous to the British Isles; and though it might be that mosquitoes were brought into this country by timber ships, he had no reason to think that the apparent occurrence of mosquitoes in most hot summers—to which attention had often been called in the public Press—had arisen in that way. He thought it possible that mosquitoes in this country did not become troublesome except under certain conditions of humidity and temperature, and when those conditions obtained, mosquitoes became troublesome. People then complained, and suggested all sorts of ways in which they might have been introduced. He did not think they had been introduced. He remembered a case in his own experience which seemed to bear upon the point. A year or two ago, at Bisley, in Surrey, he was sitting outside a hut, when suddenly he was troubled by mosquitoes in a way he had not been since he was on the Amazon, in Brazil. They bit him, and a companion, furiously for a quarter of an hour. That occurred at 8.15 on a July evening. Suddenly a light cool breeze sprang up, and the mosquitoes at once disappeared and did not trouble them again. At that particular moment he believed the conditions were such as to stimulate them to bite. At another time, with different atmospheric conditions, one might sit out with impunity without being bitten.

Surgeon-Major BLACK said that in the course of his services abroad he had a good deal of experience in seeing and treating malarious diseases, especially while he was stationed at Hong Kong, where there was a serious epidemic, which affected most of the troops there who were returning from an expedition. The conditions were insanitary, and certainly mosquitoes were very prevalent. They were of course provided with mosquito netting, but he did not think it likely that the mosquito would ever be accused of causing fever among the troops in barracks, and no one had a bad word to say against

mosquitoes except that they were annoying. The insanitary conditions at Hong Kong and Shanghai were sufficiently obvious to receive the credit of causing the fevers and aggravating them. In China there seemed no definite plan in the building of the houses in 1842, and consequently the dwellings, like those in most English towns, were higgledy-piggledy, and Chinese labourers, servants and shopkeepers were mingled up with European compounds promiscuously. The Chinese naturally had dirty habits, and polluted the vicinity of their houses to a gross extent, quite sufficient to constitute a sanitary nuisance. They also had a habit of drying their manure on the hill sides, amongst the terraces of the European inhabitants, and they came every day to those banks of refuse and turned them over to the sun, exposing different portions to the air until all became dry. Then it was removed in sacks. Hong Kong was built on a slope, and the foul air from those terraces floated through the houses and came out of the windows, at the back. In addition, the shore itself was polluted to an extraordinary extent. Many of the Chinese lived in boats and junks all over the harbour, and simply tossed their excreta overboard, with the result that the shore became polluted to an incredible degree. The European vessels also flung their excreta into the harbour. He believed the malaria at Hong Kong was of a compound nature—that there was intermittent ague, and a remittent fever along with it, and occasionally this was mixed up with malaria. Often it happened that if one escaped one form of fever it was only to fall a victim to another. Frequently at *post-mortem* examinations on cases of pneumonia the spleen would be found to be immensely enlarged, but it had not been complained of during the life-time of the patient. Therefore he had probably been accumulating malaria germs for days or weeks. A great part of the garrison at the time of which he was speaking was located at Kowloon, opposite to Hong Kong, where they were in huts; there was no common building for them there, as at Hong Kong. There was a powerful odour emanating from these huts, and added to it was a marshy smell, which was very noticeable about the men when they crossed over to

Hong Kong or were placed in hospital. Even healthy men became infected with the odour, and it was thought that the fever originated at Kowloon, though, in the light of recent knowledge, it was highly likely that the mosquitoes were at the bottom of the trouble. Since sanitary measures had been introduced there the mortality from malaria had been much reduced. The water was now obtained from the hills at a distance, and conducted by pipes, but that was not the case when he was there. At that time the water was obtained from the wells and dams along the sides of the hill, and these were polluted by the washings from the sides of the hills, and from the yards in the houses. It was no wonder that disease broke out. Now permanent barracks were established at Kowloon, resulting in a greatly reduced mortality on that side of the water. It would be interesting to see whether fever broke out in the troops now there, and to read the reports from the present Medical Officers of health on that station.

Dr. HOBSON (Harrogate) said the address to which they had listened was most interesting. There were certain points which struck him particularly, one of which was with regard to the influence of the mosquito upon the human subject. Was it proved that the insect bit man only in the evening? The Governor of British Guiana told him that it was not so. He would like to hear that point cleared up.

Dr. TREGELLES FOX said he had listened with very great interest, and, he hoped, with not a little instruction, to the very able and eloquent paper which had been read by Dr. Waddell. He felt that the writer of the paper made good his points in a general way, though he would like a great deal more information in detail concerning the life history of the malarial parasite, the mosquito, and man, in their triple relationship. To his mind there was a good deal of hiatus to be filled in. Where was the malarial parasite before man and the mosquito came upon the scene? Was it to be found in the soil, either in a dry or in a moist condition? Many such queries occurred to his mind, and he had no doubt that in time the investigations of scientists would answer them. He had

had seven years' experience in a malarial country, and had lain for forty days in the grip of malignant malarial fever with the mosquitoes buzzing around his head. He was in Madagascar from twenty to thirty years ago, when the idea of the mosquito being the cause of malaria was not mentioned, though he remembered some had the impression that they probably might be connected with it. None of them, he regretted to say, took the trouble to make accurate investigations on the subject; they were always too busy about their work, and consequently did not rise to the occasion. He would like to refer to one or two points of a general nature, his object being to ask the writer of the paper how he would explain such facts, if they were accepted as true, according to the prevalent theory. The place where he lived was surrounded by rice fields, which extended nearly all round Antananarivo. The natives worked in the rice fields, and the doctors worked amongst the natives, and did not consider them specially unhealthy. But there were parts of the country which were recognised as fever-breeding swamps, especially at the commencement and end of the rainy seasons, and there were certain parts where it was quite unsafe to go during those times. They had the impression there that the rice fields over which water was perpetually running were not specially unhealthy, but that stagnant water was a much greater cause of fever. They also had the impression that when, in a dry season, land which was usually submerged was exposed to the air, there was a great deal of increased fever. One other point he intended to refer to had been spoken on by Surgeon-Major Black, namely, bad smells, and whether or not they could be the cause of fever. Certainly in many instances bad smells proved an exciting cause of an attack of fever.

The CHAIRMAN said, with regard to the last observation, that he had that evening received a letter from his son at the Cape describing how they had been driving along amongst the decayed corpses of oxen, 300 of which he counted in three miles around Rustenburg. After passing that region he was laid up with dysentery. One could easily understand all sorts of diseases arising under such conditions. The

corpses could not be buried, and 1,100 oxen appeared to have died along that particular route, so that it could be easily imagined how advanced the decomposition would be.

Dr. FORTESCUE FOX said there were one or two questions which he would like to put to the reader of the paper. Dr. Waddell had said nothing about the production of immunity. He (Dr. Fox) thought it was the fact that some races in malarial countries were practically immune from malaria, or at any rate, the disease in them was of very reduced virulence. Had it been proposed in a practical way that those who were sent out as pioneers should be those immunised against the complaint. At Hong Kong it had been customary to choose men of a certain race to clear the jungles and do dangerous work of that kind. He expected to hear Dr. Waddell refer to the serious results which occurred in Hong Kong in the forties, when new ground was opened up, a party of soldiers was almost decimated by malignant malarial disease.

The lecturer had not named among the remedies eucalyptus. A few years ago a good deal was heard about planting eucalyptus trees in Italy; was that still regarded as a prophylactic or a valuable proceeding?

Dr. Waddell instanced Corsica as an island that might very easily be dealt with in the way he mentioned; but would not that expose the inhabitants to the danger of re-infection in a much more malignant form—in fact, a repetition of the Mauritius epidemic? The disease having entirely disappeared for a time, and familiarity with it having been lost, was there not the danger of a fiercer type being reintroduced? Did that not point to the possibility of keeping up a certain degree of immunisation in those countries?

Dr. MORGAN DOCKRELL said he was present in order to gain information, and he had obtained a great deal. His object in speaking was to refer to a case of great interest now under his care, which he regarded as absolutely unique in this country. It was one of parangi. Europeans seemed to escape the disease. Though his patient seemed to be European, he had, with some difficulty, found that there was an inter-marriage with a resident of the Island of Ceylon. In malaria

the condition of the water played an important part in production, with the aid of the mosquito, and in parangi they had a condition which seemed to be, in many respects, like malaria. But in parangi the individual attacked was either a native or one who had inherited some special tendency from inter-marriage with a native. The condition of the temperature in his case seemed to indicate that the disease was of a malarial character, though careful microscopical examination of the blood failed to reveal anything except staphylococcus aureus in the pus which was present. He would be glad to hear from the lecturer if he had any experience of parangi, or whether any one present had. He would be glad to show at his laboratory, to anyone who wished to see them, excellent sections of mosquitoes.

Dr. SUNDERLAND read the following letters which he had received :—

Dr. Felkin writes : “ I am very sorry that I cannot get to the meeting to-night as I had quite intended, as I wanted to speak. As it is impossible for me to come might I ask you to do me the favour of showing the meeting the enclosed model of the traveller's mosquito-net which I have used since 1878, and advised all my students and friends to use. In 1878 we, *i.e.*, Gordon Pasha, Emin Pasha, and I, were pretty well sure that mosquitoes, &c., had a good deal to do with the spread of malaria, and so sure was Gordon on this point that he made me promise not even to get out of the net at night to pass water. I have published a note on this in the *Journal of Tropical Medicine*. The model is on the scale of one inch to one foot. Dickeson and Stewart, 94, Queen Victoria Street, E.C., make these nets, and I am sure would be glad to show them to anyone interested ; they cost about £1.”

Dr. Pruen writes : “ I am sorry I cannot come up to the meetings on Friday, but I have an appointment here which I cannot get off or put off. Please make my apologies for absence to the Chairman. I should like to have spoken on malaria. I both suffered severely from malaria and saw much of it for four years in East and Central Africa. It is worst where mosquitoes are worst, but it certainly is

present where they are absent. And people who are absolutely immune to mosquitoes (whom mosquitoes never seem to like to alight upon) yet get attacks of malaria. The abolition of mosquitoes would not extinguish malaria, but it would reduce it to within manageable limits. Felkin says you do not get malaria above 4,000 feet (I think) in Central Africa. I should say that you rarely *acquire* it above that height, but are very likely to develop it there if you come up from a malarial district. In non-mosquito districts you do not get malaria if you boil your water."

Dr. WADDELL, in replying on the discussion, thanked the members for their cordial reception of his paper. He read the following letter which he had received from Surgeon-Major Ross :—

"I regret extremely that I shall not be able to come to town for the meeting. I trust, however, that you will let us have a copy of your address and of the discussion. My view on prevention of malaria is that our principal malarious towns should be kept as well drained as possible, and that municipalities should keep native mosquito-killers. Also that Governments should issue instructions to their sanitary officials to take steps in this direction."

Dr. Fortescue Fox's queries were all interesting. He had raised the question of immunity, but that was dealt with in his (Dr. Waddell's) address; artificial immunity was of so little assistance that they might, in the discussion on the prevention of malaria, pass it by. Quinine presented great difficulties because it could not be tolerated in continuous doses. Arsenic, in the hands of Italians, had proved very valuable, and the statistics of its use were encouraging. The matter was being worked out very thoroughly by the Italians.

While it was true that some races showed a natural immunity, these people were not of the stamp as a rule to select pioneers of any sort from, as they were survivals in spite of generations and centuries of exposure to malarial influence by which the intellectual and resourceful had been weeded out or driven away. Individual immunity, on the other hand, was too sporadic a phenomenon to be of any practical value,

and could only be demonstrated after exposure to malaria. Again, racial immunity was a very misleading thing, as the children in these peoples were invariably found to be suffering from malaria, showing that the supposed immunity of the adults was entirely a factor acquired by their survival from childhood.

With regard to the question asked by Dr. Fortescue Fox as to whether, on an island like Corsica, clearing off the disease would not render the disease, in case of return, more severe, he did not think so. Moreover, we intend to have no return. They might apply the same argument to small-pox and scarlet fever.

Eucalyptus had not only proved of no value, but it had been proved to afford shelter to the mosquitoes. At Hong Kong it was found that wherever stagnant water did not drain away, the mosquitoes found a nest.

Dr. Hobson had asked about the time at which the mosquitoes were in the habit of biting. He (Dr. Waddell) thought it was a question of species, district and sunlight. He had sat in a portico in South America and been bitten all day long. He believed that was also the case in Lapland and Southern Russia; but it did not follow that those mosquitoes which bit in the daytime were the ones which bit at night, or which carried malaria.

Dr. Tregelles Fox raised a most interesting point. He suggested he (Dr. Waddell) had not dealt with the real beginning and specialisation of the malaria germ; but his paper was intended to deal only with the suppression of malaria. Still, the point was an interesting one, and he would like to go into it. It was simply a form of animal blood parasite, and was a case of specialisation; he thought the ordinary laws of evolution would explain it. There were numerous first cousins of it existing in nature. There were three forms occurring in the human body, another form in cattle, another in sheep; another form occurring in birds found its definitive host in the culex and not in the anopheles; and other forms undoubtedly occurred in the horse.

That bad smells, mephitic vapours and miasmata generally

were sources of malaria as known to us was an exploded theory in view of our knowledge that malaria was due to a specific blood parasite with a definite life cycle now also known to us. Besides, experiments have demonstrated that it is possible to live in the most miasmatic and malarial localities without any risk whatever so long as no biting by mosquitoes is permitted.

Surgeon-Major Black's remarks as to the conditions at Hong Kong were most interesting. He came and narrated the ideas which prevailed fifteen or twenty years ago ; and it was most interesting to compare present knowledge with that of so recent a period, and to see the enormous advances which had been made.

He would like to correct the Chairman on one point about British malaria. They did not depend altogether upon imported mosquitoes in this country for malaria. He believed that as recently as 1887 there were no less than 112,000 cases of endemic malaria in this country, the county of Bedford heading the list for these ; tertian and quartan ague were present, just as they were since the marshes were first inhabited by man.

Mr. Austen did not quite fall in with his (Dr. Waddell's) sanguine view on the extermination of the mosquito ; but he was inclined to adhere to his contention. If they would only tackle the question boldly and bravely, enlist an army of capable officials, and give them the power to put their commissions into effect, he believed they would succeed in making the most stupid and ignorant nigger come up to the standard and assist in the measures for the protection of himself and his environment.

The CHAIRMAN having announced that the subject of the next meeting would be "Anæmia," the meeting terminated.

## Original Communications.

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### ON SUBCUTANEOUS FIBROUS NODULES AS EVIDENCES OF RHEUMATISM.

BY C. O. HAWTHORNE, M.D., M.R.C.P.

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THE recognition of the development of fibrous nodules in the subcutaneous tissue as a possible feature in the course of rheumatism in childhood and early adult life, dates for practical purposes from the paper submitted by Barlow and Warner<sup>1</sup> to the International Medical Congress of 1881. Isolated cases had been recorded before this, but the credit for a full presentation of the facts and for a discussion of their significance is mainly due to the authors here mentioned. It was they who introduced the rheumatic nodule to the English-speaking world. The comparatively late recognition of the existence of subcutaneous nodules in rheumatism is doubtless explained by the frequency with which they present an appearance the reverse of conspicuous, so that, as Barlow and Warner pointed out, they are "often more palpable than visible," and that "to demonstrate their existence it is often necessary to stretch the skin over them." Since 1881 the majority of writers on rheumatism have included subcutaneous nodules among the possible evidences of the disease, and both in special monographs and in books dealing with clinical medicine<sup>2</sup> generally the nodules are now usually figured. They are also, no doubt, practically familiar to the majority of modern practitioners, more especially to those who are extensively engaged in the study and treatment of disease in children. It is, therefore, quite unnecessary that the clinical features of the rheumatic nodule should be described here. Subsequent observation has in no material

sense qualified the accuracy of the description given in the paper above quoted. But there are certain respects in which more extended knowledge has shown that the original basis of observation was somewhat narrow, and that some of the conclusions founded on it require some measure of modification. This statement applies to (1) the size of the nodules, (2) their duration, and (3) the age at which they occur.

The original statement in regard to the size of the nodules was that they varied in size from that of a pin's head to that of an almond, and there can be no question of the substantial accuracy of this description. In the great majority of cases, indeed, the nodules are so small that unless a special search is made for them they are apt to escape recognition, especially when, as is often the case, they are few in number and, as occurs occasionally, they enjoy an existence counted only by days. But there is quite an appreciable body of evidence to show that now and then some of the nodules attain a decidedly larger size than the maximum mentioned in the original paper. Some have been described as large as a walnut, and in one case they were reported as "open, gross, and palpable excrescences." Futcher,<sup>8</sup> in 1885, published a paper in which, whilst recognising the typical rheumatic nodule as a small, extremely firm, fibrous structure, distinctly rounded and easily moveable beneath the skin, he noted the occasional occurrence of another variety of decidedly larger size and softer consistence, and having, as he believed, a fibro-lipomatous character. These and other examples may be quoted to show that, as an exceptional event, the subcutaneous nodule of rheumatism may be a more imposing tumour than the original description would suggest.

The paper by Barlow and Warner was based upon a study of the nodules as these occurred in twenty-seven cases. In one instance the nodules appeared and disappeared in the course of three days; in several cases their existence was a matter of a few weeks; and in one patient they were observed to last for five months, this being the period of maximum duration. Again, there is no difficulty in recognising that the course of events thus described is the usual course, but

marked exceptions occur, though, perhaps, only very occasionally. Several instances have been put on record in which the existence of nodules was observed to extend over a term of years. Cavafy<sup>4</sup> has reported one case in which subcutaneous nodules lasted for at least a year; Middleton<sup>5</sup> found nodules present in a woman in whom they had developed three years earlier—during an attack of rheumatic fever; and in Futcher's list are two examples of nodular persistence for eight years, and one in which the condition existed for at least fifteen years. It is worthy of note that in all these cases the patients were adults, whereas Barlow and Warner's patients were all either children or young people. They thus help to confirm the opinion that when rheumatic nodules occur in adults they are apt to be more persistent than is usually the case when they are found in patients under the age of puberty. This, however, does not mean that rheumatic nodules in adults are invariably of considerable duration. On the contrary, it is most certainly true that, at times, subcutaneous nodules develop in adults which correspond in every respect to Barlow and Warner's description. They may, just as they do in children, rapidly appear, sometimes in successive crops, last for a few days or weeks, and then gradually and completely fade away.

The statement just made involves the proposition that, as evidences of rheumatism, subcutaneous nodules are more frequent in children than in adults. This is certainly true so far as the experience of observers in this country is concerned, though Osler,<sup>6</sup> in remarking on their relative infrequency in Baltimore and Philadelphia as compared with London, remarks: "Since 1881 I have been in the habit of looking for them . . . and I have seen a larger number of instances in adults than in children." In Barlow and Warner's list the great majority of the patients were children under 12 years of age, and the maximum age was 18 years (two cases). At various dates since 1881 instances have been reported showing that the maximum limit must be carried to a much higher level. West,<sup>7</sup> Middleton,<sup>5</sup> Coutts,<sup>8</sup> Futcher,<sup>3</sup> and others have recorded cases of well-marked nodules occur-

ring in patients in advanced middle life. The general rule, however, remains true, that subcutaneous nodule formation is a **rheumatic event** to be expected in early rather than in later life. But it is a rule to which there are undoubted, if only occasional, exceptions.

Passing now from the facts of the so-called rheumatic nodules it is of interest to enquire whether the original conclusions with regard to the significance of the nodules have been sustained, or modified, by the criticism provided by further observation. And here also it is only just to express a highly appreciative and grateful opinion of the practical value of the teaching founded on the original observers' results. There cannot be the least doubt that subcutaneous fibrous nodules form one of a series of events, which, in various combinations, may display themselves in children, the subjects of what it is convenient to call rheumatism. When associated with arthritis, pains in the joints or limbs, chorea, endocarditis, tonsillitis, or other generally recognised evidence of that disease, it is a natural and justifiable presumption that both they and their associates are "rheumatic" in nature. Further, it is equally certain that the presence of subcutaneous nodules under the circumstances just defined is a fact of "serious import," inasmuch as their existence is usually associated with cardiac disease, apt to be progressive in character. In Barlow and Warner's twenty-seventy cases there was "abundant and conclusive evidence" of cardiac disease in no less than twenty-six, and even the single exception to this statement presented a first sound open to grave suspicion. In twelve cases the cardiac disease was observed to become more severe—"that is to say the valvular murmurs altered and the dilatation increased under observation, in spite of the employment of digitalis and rest"; eight out of the twenty-seven patients died from the results of heart disease; and in the five autopsies obtained there was mitral disease in all, four also had pericarditis, and in no less than three the endocarditis affected the tricuspid and aortic as well as the mitral valves. Both conclusions, viz., that subcutaneous nodules having a spontaneous tendency to subsidence and a proneness to

relapse, occur not infrequently in rheumatic children, and that they are in the great majority of cases\* allied with serious cardiac disease, have been abundantly confirmed in the experience of many physicians. Concerning these propositions it may safely be said there is no dispute. There remains, however, a further question, namely, whether subcutaneous nodules having characters such as those already described, ever occur apart from rheumatism. That question, it may at once be granted, can only very occasionally claim any practical importance. For, as already allowed, nodules are as a matter of fact associated in the great majority of cases with some other evidence of rheumatism, and their appearance is no more a matter of surprise than is, say, the development of albuminuria in a case of scarlet fever. In Barlow and Warner's cases, twenty-five out of twenty-seven had, in addition to cardiac disease, either unquestionable rheumatic fever, arthritis with effusion, or pain in one or more joints, and in the majority of the patients there were also such conditions as erythema, chorea, &c. In the two instances in which there was an entire absence of evidence of rheumatic fever and of joint affections, the patients were the subjects of mitral regurgitation—a condition which, even when existing as a single pathological fact, in childhood justifies a suspicion of rheumatism. There cannot therefore be any reasonable objection to the view that in all such cases, subcutaneous nodules when they develop are the result of "rheumatic" influence. But it is still open to ask whether subcutaneous fibrous nodules are universally and invariably rheumatic, or whether, like other members of the rheumatic series, as *e.g.* arthritis, tonsillitis, purpura, &c., they may occur as a result of causes other than rheumatism. Barlow and Warner concluded that "subcutaneous nodules, having such a life history as we have des-

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\* At a recent meeting of the Clinical Society of London, Dr. Hugh Thursfield reported the case of a boy, aged 9, suffering from rheumatic periostitis, who was covered from head to feet with subcutaneous nodules, and in whom there was no evidence of endocarditis. Reference was also made to a similar case shown to the Society by Dr. Hadden in 1889. (*British Medical Journal*, January 19, 1901, p. 150.)

cribed. . . . may be considered as in themselves indicative of rheumatism, even in the absence of pain." Several later writers put the claim of the subcutaneous nodule to be an unquestionable evidence of rheumatism in still more emphatic terms. They were for some time described as "absolutely and solely rheumatic" and as "a positive indication of rheumatism." Such a position at the present day can, however, hardly be defended. In the first place subcutaneous fibrous nodules having histological characters identical with the "typical rheumatic nodule" are found not very infrequently in rheumatoid arthritis.<sup>9</sup> The most common situation for such tumours is on the posterior aspect of the elbow joint, which is also one of the most frequent sites of the nodules that are apt to accompany the acute and subacute rheumatic attacks of childhood, but they may also be found elsewhere, as for example over the metacarpal or metatarsal bones or in connection with tendons. The tumours in rheumatoid arthritis are for the most part much larger and more persistent than the ordinary rheumatic nodule. But they are sometimes quite small and give evidence of a tendency to disappear and to recur.

Of course it may be contended that rheumatoid arthritis is simply a form of rheumatism, but in view of the different opinions which are advanced on this point, it is necessary to recognise that in addition to rheumatism in its universally admitted forms, subcutaneous tumour formation may mark the course of rheumatoid arthritis. How far this fact may be used as an argument in favour of the essentially rheumatic nature of the last mentioned disease is a matter for consideration. Its cogency in this respect is somewhat weakened by the occurrence of subcutaneous fibrous nodules in various other conditions. Thus nodules having exactly the characters of those present in the neighbourhood of the elbow-joints in rheumatoid arthritis, have been found in cases of gout,<sup>9</sup> and Sir Dyce Duckworth<sup>10</sup> has seen numerous subcutaneous nodules appear over each tibia in a case of acute gout. At various times odd cases of syphilis<sup>11</sup> have been described in which small firm nodules developed in symmetrical arrangement over the bony prominences of the limbs, their symmetry

and position, as well as their other characters, exactly suggesting the nodules described by Barlow and Warner as indicative of rheumatism. Other cases in which a definite diagnosis could not be stated, have displayed similar features. It seems impossible in the face of this evidence to adhere to the doctrine that subcutaneous nodules are a distinctive note of rheumatism. That they are often or even usually members of the rheumatic series may be readily allowed. But it is necessary to depose them from the pride of place originally allotted to them and to recognise that, like most if not all other members of that series, subcutaneous fibrous nodules may occur apart from rheumatism, though, it must be allowed, and that not grudgingly, that their recognition and description constituted a diagnostic and prognostic advance of high value in our clinical knowledge of the form and circumstance in which, more particularly in children and young adults, that disease may express itself.

## REFERENCES.

- <sup>1</sup> *Transactions of the International Medical Congress*, 1881, vol. iv., p. 116.
- <sup>2</sup> See e.g., A. E. Garrod, "Treatise on Rheumatism."  
W. B. Cheadle, "The Rheumatic State in Childhood."  
Judson Bury, "Clinical Medicine."
- <sup>3</sup> *Johns Hopkins Hospital Bulletin*, October 10, 1895.
- <sup>4</sup> *Transactions of the Pathological Society*, 1883.
- <sup>5</sup> *The American Journal of the Medical Sciences*, 1887.
- <sup>6</sup> On Chorea and Choreiform Movements, Win. Osler, M.D., 1894.
- <sup>7</sup> *St. Bartholomew's Hospital Reports*, 1886.
- <sup>8</sup> *Illustrated Medical News*, 1889.
- <sup>9</sup> Rheumatism, Rheumatoid Arthritis, and Subcutaneous Nodules, C. O. Hawthorne, M.D., 1900.
- <sup>10</sup> *Transactions of the Clinical Society*, vol. xx.
- <sup>11</sup> *Ibid.*, vol. xvi., pp. 188-190.

# SUBSEQUENT HISTORIES OF PATIENTS APPARENTLY CURED UNDER ADMINISTRATION OF ANTI-TUBERCLE SERUM AS AN AUXILIARY TO THE CLIMATIC TREATMENT.<sup>1</sup>

BY J. EDWARD STUBBERT, M.D. (LIBERTY, NEW YORK).

AT our annual meeting in 1898 I had the honour of presenting to you a paper, entitled, "Some Statistics upon Sero-Therapy in Tuberculosis." There were reported to you in the conclusion of that paper thirty-six incipient cases, which under anti-tubercle serum treatment showed 39 per cent. apparently cured. Fifty-five per cent. were generally improved, as evidenced by decrease in tubercle bacilli, expectoration, and cough ; increase of weight, strength, appetite, and more or less improvement in physical signs of disease. Of this 55 per cent., 9 per cent. may fairly be declared arrested cases.

There were also reported forty-two moderately advanced cases treated in like manner, of which bacilli were decreased in 30 per cent., weight gained in 61 per cent., and in between 71 per cent. and 85 per cent. a marked improvement of all other symptoms was shown. One apparent cure was noted in this class.

Four far advanced cases were reported, showing general improvement of physical signs, appetite, cough and expectoration in 25 per cent., and increase of weight in 50 per cent. No decrease of bacilli or apparent cures were noted among this class.

Summarising the three classes of cases reported, it was shown that eighty-two patients were treated with the following results :—

No. of cases treated	...	...	...	...	82.
Expectoration decreased in	...	...	...	82	per cent.
Appetite improved in	...	...	...	81	„ „

<sup>1</sup> Reprinted from the Transactions of the American Climatological Association

Weight gained in	...	...	...	78 per cent.
Physical signs improved in	...	...	...	78 " "
Temperature decreased in	...	...	...	49 " "
Bacilli disappeared in	...	...	...	13 " "
Bacilli decreased in	...	...	...	35 " "
Cough decreased in	...	...	...	79 " "
Apparent immunity established in	...	...	...	21 " "
General improvement in	...	...	...	78 " "

In closing the paper the writer said as follows: "I wish to place myself distinctly on record as not being, as yet, a thorough convert to sero-therapy in the treatment of tuberculosis; I appear before you simply as an investigator of this subject. I believe that we are investigating along the right line, that the results of serum treatment are, as a whole, more satisfactory than treatment by any one drug; but as yet we have found no specific for this dread disease."

In pursuance, therefore, of investigation and study of this subject, it has seemed to the writer that it would be of interest to the members of this Society to hear of the present condition of those patients reported two years ago, as comprising the 39 per cent. apparently cured, as well as the present condition of eleven whose histories were not included in the former paper.

There was a total of fourteen patients comprising this 39 per cent. reported. It has been possible to trace and obtain accurate histories of only nine, but in addition to these, the remaining five are known by general repute to be in the same condition as when they were discharged; we have no knowledge of any relapses. Those whose histories have been traced, numbering nine, are divided into two classes, representing respectively those who have been discharged three and two years.

Four have been away for three years, and their histories are as follows:—

CASE 1.—On admission to the sanatorium showed signs of incipient tubercular involvement down to the second interspace anteriorly, and to the spine of scapula posteriorly, on the

right side. The examination of the sputum showed numerous tubercle bacilli with mixed infection. Serum was administered for six weeks in Liberty, then the patient returned to New York City and the injections of serum were continued for five months longer. Shortly after returning to his old environment, the tubercle bacilli had disappeared, the patient gained seven pounds in weight, and was apparently cured. During three winters he has been constantly at work. His present condition is excellent; there is neither cough nor expectoration, and the physical signs in his lungs are negative. The patient has lost four pounds since returning to work, leaving a net gain of three pounds.

CASE 2.—Entered the sanatorium suffering from incipient tuberculosis; no tubercle bacilli were present in the sputum. Serum was administered for three months. Patient gained fifteen pounds in weight, and was apparently cured when she returned to her old environment, where she has been at work for three years. Present condition is excellent; there is neither cough or expectoration, physical signs in her lungs are negative, and the patient has gained ten pounds since returning to work.

CASE 3.—Entered the sanatorium with incipient tubercular involvement at both apices; numerous tubercle bacilli were present in the sputum. Serum was administered for four months at the sanatorium, and for one month after the patient returned to New York City. The tubercle bacilli disappeared after four weeks' treatment, the patient gained forty pounds, and was apparently cured when discharged from the sanatorium. This patient has been at work for three years. She had an attack of gripe last summer. At present she is anæmic, has neither cough nor expectoration, the physical signs in the lungs are the same as at the time of discharge, slight dulness at right apex. There has been a loss of twenty of the forty pounds gained here, her weight now being normal.

CASE 4.—Entered the sanatorium with incipient tubercular involvement of the right upper lobe. The examination of the sputum showed a few tubercle bacilli with mixed infection.

Serum was administered for two months and a half. The patient gained ten pounds in weight, the tubercle bacilli disappeared, and she was apparently cured when discharged from the sanatorium. This patient has been at home for eighteen months, and her present condition is excellent ; the physical signs in the lungs are negative, and there is neither cough or expectoration.

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Five patients have been away for two years, and their histories are as follows :—

CASE 1.—Entered the sanatorium with incipient tubercular involvement of both upper lobes, and a moderate number of tubercle bacilli present in the sputum. Serum was administered for six months. Tubercle bacilli had disappeared, the patient had gained five pounds, and was apparently cured when discharged from the sanatorium. She worked in New York City for fifteen months, and then returned for the purpose of entering the Nurses' Training School at the sanatorium. Her present condition is excellent ; the physical signs are negative ; weight is stationary ; cough and expectoration, due to chronic bronchitis, are still present. The tubercular process in this case was engrafted upon a bronchitis of many years' duration.

CASE 2.—Entered the sanatorium with incipient tubercular involvement of the right upper lobe ; a moderate number of tubercle bacilli and mixed infection were demonstrated in the sputum. Serum was administered for six months. Tubercle bacilli disappeared, the patient gained eight pounds in weight, and was apparently cured when discharged two years ago. This patient also entered the Nurses' Training School at the sanatorium immediately after she was discharged. She has spent four months in New York City, in hospitals, training as a nurse, with long irregular hours, and of course in a comparatively unhealthy atmosphere. Her present condition is excellent ; physical signs in the lungs are negative ; there is neither cough or expectoration, and her weight is stationary.

CASE 3.—Entered the sanatorium with incipient tubercular involvement of both upper lobes ; no tubercle bacilli could

be found in the sputum. Serum was administered for one month. Patient gained five pounds in weight. He has lived in his old environment for twenty-one months; his present condition is excellent; physical signs in the lungs are negative; there is neither cough or expectoration; the patient has gained nine pounds since returning home.

CASE 4.—Entered the sanatorium with incipient involvement of right apex; tubercle bacilli were demonstrated in the sputum. Serum was administered for three months and a-half. Tubercle bacilli disappeared, the patient gained nine pounds in weight, and was apparently cured when discharged from the sanatorium. He returned to his old environment, but engaged in out-door instead of in-door work. His present condition is excellent; signs in the lungs are negative; he has neither cough or expectoration, and has gained seven pounds since returning to work.

CASE 5.—Entered the sanatorium with incipient tuberculosis; tubercle bacilli were present. Serum was administered for seven months at the sanatorium, and continued for six weeks after the patient's return home. Tubercle bacilli had disappeared, and the patient was apparently cured when discharged from the sanatorium. This patient has lived at her home for twenty-two months; she had an attack of the grippe last winter; her present condition is good; the physical signs in her lungs are the same as on discharge, slight consolidation at left apex, there is neither expectoration or cough, and the patient has gained two pounds since returning home.

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In addition to the five patients above reported, as being away from the sanatorium for two years, I wish to report an apparently cured case from among the moderately advanced class.

CASE A (6).—Entered the sanatorium suffering from tuberculosis, in the moderately advanced stage, at both apices; a moderate number of tubercle bacilli were demonstrated. This patient showed also tubercular involvement of the throat, evidenced by infiltration of the interarytenoid space, and a

tubercular ulcer in the trachea. Serum was administered for five months at the sanatorium, and for a short time after her return to New York. The larynx and trachea received local treatment, which did not differ in any respect from that employed in New York City. Tubercle bacilli disappeared, the trachea and larynx resumed their normal conditions, the patient gained ten pounds in weight, and was apparently cured when discharged from the sanatorium. This patient has spent two winters in New York City, going away for the summer months; she has had one attack of the grippe and one of pneumonia since returning home. Her present condition is good, physical examination of the lungs shows a fibroid condition at one apex, and a slight amount of bronchitis; expectoration and cough are slight. Weight remains about stationary; tubercle bacilli have never been found in the sputum, although specimens have been frequently examined, since the patient left the sanatorium.

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In addition to these apparently cured cases of two and three years ago, I wish to report those who have been discharged for a year or less, and who have spent at least one winter in their old environment. Six were treated in the sanatorium, and seven in private practice, making a total of thirteen patients. Of these thirteen the subsequent histories of nine have been traced definitely, and are as follows:—

CASE 1.—Entered the sanatorium with incipient tubercular involvement of the right apex; no tubercle bacilli were present. Serum was administered for five months. The patient gained seven pounds in weight, and was apparently cured when discharged. He spent last winter in his old environment; his present condition is good; there are signs of slight fibrosis at the right apex, but no cough or expectoration. Patient has gained two pounds since returning home; he has been away from the sanatorium for nine months, two of which have been spent in travel.

CASE 2.—Very incipient tubercular involvement, with tubercle bacilli present in sputum when admitted to the

sanatorium. Serum was administered for nine months. The bacilli disappeared, the patient gained nineteen pounds in weight, and was apparently cured when discharged. She has lived in her old environment and been at work for about seven months. Her present condition is excellent; the physical signs in the lungs are negative; there is neither cough or expectoration, and her weight remains stationary.

CASE 3.—Infiltration at right apex; tubercle bacilli moderate in number. Serum was administered for four months, the dose being  $\text{m}$  40. No re-action. Bacilli disappeared, the patient gained twenty-one pounds in weight, and was apparently cured when returning to old environment, where she remained from October last to February of the present year, when she returned to Liberty. Her present condition is excellent; fibrosis established at the right apex; slight cough and expectoration still present, but without tubercle bacilli; weight is now stationary.

CASE 4.—Infiltration at right apex, at the base of the left lung, and at the left upper lobe; tubercle bacilli few in number. Serum was administered for two-and-a-half months, the dose being  $\text{m}$  45. No re-action. Tubercle bacilli disappeared, the patient gained eighteen pounds in weight, and was apparently cured when he returned to his old environment and work, where he spent one winter and summer. Last winter he spent in the south, where he went on business. He has been away from Liberty for fifteen months. His present condition is excellent; physical signs in the lungs are negative; there is neither cough or expectoration present, and the weight remains stationary.

CASE 5.—At the beginning of treatment there was infiltration at the right apex, and tubercle bacilli, moderate in number, were found in the sputum. Serum was administered for three months, the dose increased to  $\text{m}$  50 q. d. No re-action. Tubercle bacilli disappeared, the patient gained fifteen pounds in weight, and was apparently cured when he returned to his old environment, where he has been for eleven months. His present condition is excellent, the only physical sign remaining is slightly jerky respiration; there is neither cough or expectoration, and his weight remains stationary.

CASE 6.—The first examination revealed infiltration at the left apex, and consolidation of the right upper lobe; tubercle bacilli were not present. Serum was administered for four months in Liberty, the dose being  $\text{m } 30$ . No reaction. The patient gained two pounds in weight, and was apparently cured when returning to his old environment, where he has been for six months, and where he still receives one injection of serum a week. His present condition is good; there is left only slight muffling of the respiratory murmur; there is neither cough or expectoration, and the weight remains stationary.

CASE 7.—There was slight infiltration at the right apex; no tubercle bacilli were demonstrated. Serum was administered for four months in Liberty, the dose being  $\text{m } 15$ ,—one reaction accompanied by a rash. The patient gained sixteen pounds in weight, and was apparently cured when she returned to her old environment, where the serum was administered for one month, and where she remained for three months and then returned to Liberty to spend the months of March and April. Her present condition is excellent. Auscultation reveals signs of scar at the right apex posteriorly; there is neither cough or expectoration, and the patient continues to gain in weight.

CASE 8.—Showed infiltration at the right apex, but no tubercle bacilli were found. Serum was administered for five months, the dose being  $\text{m } 25$ —one reaction occurred. The patient gained seven pounds in weight, and was apparently cured at the time of leaving Liberty. Her present condition is good; physical signs in the lungs are negative; there is neither cough or expectoration, and she has gained six pounds since returning to old environment.

CASE 9.—(Special). This patient I have introduced here, not because she is, as yet, apparently cured, but on account of an interesting ocular complication. Before coming under my care this patient developed tubercular kerato-iritis, evidenced by three foci of infection as shown by the accompanying diagram, kindly loaned to me by Dr. E. S. Thomson, of New York City. This patient was sent to me for

the purpose of determining whether there was a tubercular condition present in the lungs which might be considered as the primary focus.

Dr. Thomson's history of the case is as follows : "On June 1, 1899, the patient noticed that the left eye was failing in vision and getting a little red and watery. She consulted several oculists, and finally came to the clinic at the Manhattan Eye and Ear Hospital. She was treated with atropine and hot-water applications, locally, and mercury



followed by iodide of potassium internally for two months, at the end of which time there was no improvement either in acuity of vision or in the inflammatory symptoms. She then came under the writer's care, and a diagnosis of tubercular kerato-iritis was made. There were at the time several grayish infiltrates in the substance of the cornea and three grayish nodules springing from the iris near the infiltration angle below. These nodules were perfectly characteristic in appearance of tubercle. The multiple character excluded sarcoma. The two months' treatment with antispecifics, which was entirely without effect, was a strong argument against condyloma, as will be appreciated by those who have

seen condyloma of the iris disappear in two or three days under mercury, as it commonly does. Condyloma commonly appears at the pupillary margin, is surrounded by dilated blood-vessels, and causes a violent reaction in the affected eye. In the case cited the nodules were grayish and cheesy looking, and the whole process was a sub-acute indolent one. Vision was  $\frac{4}{200}$ .

On account of the local condition, her lungs were examined by Dr. Stubbart, and she was sent to Liberty and placed under treatment, August 25. On October 5 she came to the city for a few days. The only local treatment she had had was atropine and hot-water applications. Her general health had improved; there was less ciliary redness, and the nodules had come forward from the substance of the iris and were lying partly in the anterior chamber against the cornea. Vision was  $\frac{20}{200}$ . Dr. Roosa was consulted and confirmed the diagnosis, and advised calomel locally.

During the next seven months she came to the city about every six weeks and stayed five or six days at a time, and had calomel dusted into the eye once a day. There was a gradual improvement during all this time. One nodule had entirely gone by December 14. The others were gradually separated from the iris, and all that now remain, June 1, 1900, are two thin cicatrices on the posterior surface of the cornea near the filtration angle. There are numerous new blood-vessels coursing through the cornea on all sides of these cicatrices. All of the corneal nodules have cleared up, leaving slight opacities, except one which seems still to have a little acute infiltration around it. The eye is perfectly white and free from inflammation. The pupil is still dilated, and the vision is  $\frac{20}{100}$ . There has never been any pain, and what slight photophobia there was has entirely passed away. The improvement in her eye has gone hand in hand with the improvement in her general condition, and it goes without saying that the former must be largely due to the latter. The local treatment was only antiseptic and soothing. It was very noticeable that the eye showed unfavourable symptoms whenever her general health failed a little. Each time there

would be an increase of the redness and the cornea would become more cloudy. As she recovered her normal tone the eye would again quiet down. While the eye cannot as yet be regarded as completely cured, it seems not too much to say that the process has been arrested and will probably continue to clear up. In addition to the history cited by Dr. Thomson, I found the patient's lung condition as follows: slight consolidation of the right upper lobe; no tubercle bacilli in the sputum. Serum has been administered for seven months, the dose being 25 m, and the patient is still under treatment. There occurred one reaction, accompanied by a rash and rheumatic symptoms. Before beginning the administration of serum, this patient had been in the Schwangunk Mountains, near Liberty, without improving; on the contrary, the condition of her eye had been growing progressively worse. This patient's general condition is very much improved; she has gained 6½ lbs. in weight; the physical signs in her lungs are as follows: slight infiltration to second interspace anteriorly, and to the spine of the scapula posteriorly on the right side. She has neither cough nor expectoration, and continues to gain in weight.

As a study of the possibility of keeping under control an active process which, we would have every reason to believe, without treatment, in old environment, would advance progressively, I wish to quote three arrested cases as follows:

CASE 1.—Entered the sanatorium with slight consolidation of the right upper lobe. When discharged she showed a fibrosis surrounding a small cavity from which, at long intervals, is discharged a small amount of secretion containing tubercle bacilli. During the intervals between expectoration there is no cough. The patient holds her own in weight, general condition, and physical signs, and has returned to her old environment and work.

CASE 2.—Left the sanatorium in an improved condition, but with tubercle bacilli present in his sputum, which have disappeared since the patient returned to his old environment, and while engaged in unhealthy employment.

CASE 3.—Had a small number of tubercle bacilli in his

sputum when he left the sanatorium, but these subsequently disappeared while the patient was living in his old environment, and engaged in his former work.

These three cases, when they left the sanatorium, were, barring the presence of tubercle bacilli, arrested cases, as far as physical signs and general condition were concerned.

#### RÉSUMÉ.

We know positively that of those discharged apparently cured, three years ago, 11 per cent. have remained so ; two years ago, 14 per cent. have remained so ; 69 per cent. have remained so of those who have spent at least one winter in their old environment.

#### CONCLUSIONS.

The reports of cases of tuberculosis treated with anti-tubercle serum under unfavourable climatic conditions are comparatively meagre, but as far as they go the results seem to have been unsatisfactory. Therefore, it would seem as though, instead of a hoped-for specific, we have in anti-tubercle serum simply another auxiliary to climatic, hygienic, and dietetic treatment. Its comparative greater merits as such an agent in the treatment of cases in the incipient stage seems to place it ahead of all other recognised agents in a large majority of instances. Its greater value may not be so well demonstrated in its immediate effects as in the fact that, *apparently*, there is established an immunity, the duration of which is as yet not determined, and can only be measured by years of observation.

In this connection it may be noted that among patients apparently cured while taking creosote, as an auxiliary to climatic influences, a few instances of relapse have occurred. Finally, the results of two years' further study of the subject would seem to indicate :—

(1) Further confirmation of the conclusions of the preliminary paper in 1898 ; (a) The use of serum does not tax the functions of digestion or produce gastritis, diarrhoea, or loss of appetite ; (b) In cases wherein bacilli have disappeared,

they have been lost while the sputa were still present, whereas in creosote cases the last specimens of sputa still contain bacilli.

(2) Immunity ~~seems~~ to be established in apparently cured cases, capable of protecting the patient effectually in his old environment at least two or three years, and *perhaps* for a longer period.

(3) The fact that cases for treatment must be selected, even among those in the incipient stage, and that it is less effective in low altitudes and city environment, conclusively ranks anti-tubercle serum among the auxiliaries to climatic treatment of phthisis rather than as a specific.

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# PETROLEUM IN THE TREATMENT OF PHTHISIS.<sup>1</sup>

BY DR. WILLIAM DUFFIELD ROBINSON (PHILADELPHIA).

CRUDE petroleum, as yielded by Pennsylvania wells and most other sources, is a liquid oil of specific gravity of .86 to .77, of strong offensive odour, and colour ranging from light yellow to greenish black. It consists of many hydro-carbons of vastly different volatility and specific gravity. They are separated by fractional distillation. A temperature of 800 Fahr. is attained before the last volatile parts distil over. Crude petroleum yields of gasoline  $1\frac{1}{2}$  per cent., purified naphtha 10 per cent., petroleum benzine 4 per cent., kerosene 55 per cent., lubricating oils  $17\frac{1}{2}$  per cent., paraffin wax 2 per cent., loss, gas and coke 10 per cent.

Each fractional distillate is purified by agitation with sulphuric acid by means of an air blast. After subsidence and separation it is washed with water, agitated with alkali and again washed.

That which remains after kerosene, and all the more volatile parts are removed, is what interests us. It includes the paraffin oils, or so called amorphous paraffins, the soft, fat-like substances officially named *petrolatum molle*, and *petrolatum spisse*. The paraffin oils are still further refined by heating with animal charcoal and repeated filtration through this or purified dehydrated clay. Any paraffin wax in solution is removed after separation by sub-zero temperature. The oil resulting from this treatment is a much greater refinement of the officinal *oleum petrolatum*. It is absolutely odourless, colourless and tasteless, and non-iridescent or fluorescent.

A form known as *terraline* by the refiners is a semi-solid, of yellowish opaque colour, and slight odour and taste. It contains some paraffin wax and has not had full charcoal treatment. That containing a little more wax is *petrolatum molle*, or the *cosmoline* and *vaseline* of commerce. In 1885, Drs.

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<sup>1</sup> Reprinted from the Transactions of the American Climatological Association.

Samuel G. Dixon and N. Archer Randolph published the results of their experiments with the administration of vaseline. From four to eight drachms were given daily. Every grain was reclaimed, unchanged, from the stools, save minute loss attributable to loss in separating and purifying. In the London letter to the *Medical News* of April 22, 1899, there was published observation of the same results after the administration of terraline. This corroborated Dixon and Randolph. My own study has been made mostly with the most perfectly refined product, the colourless, odourless oil, before mentioned. That every minim swallowed passed entirely through the intestinal tract of man unchanged was repeatedly proven. It was argued by the English writer that, since all could be reclaimed from the fæces, it therefore could have no therapeutic effect, other than simply lubricating the intestines and so making bowel movements easy. Reliance on securing any other result was vigorously discouraged. It can be assuredly asserted that the effect of the administration of these petroleum products is decided, and is far more than a simple intestinal lubricant. In over fifty cases selected during the past four years, where nutrition, digestion, and body weight were impaired, and the purest oil administered in one or two-drachm doses, four times a day, for periods of from three to six months, there was in every instance increase in weight and improvement in health, strength and feeling of well being.

The gain in weight was  $5\frac{1}{4}$  to  $23\frac{1}{2}$  lbs. There was no other change in living conditions or medication, which might have caused these improvements. It gave no discomfort in any instance, as it is absolutely indigestible, and unchangable in the intestinal tract, and so no ill of any kind resulted. Nature evidently made no effort towards its digestion or assimilation. In passing of gall stones I have given nearly a pint in a few hours. Its action must be purely mechanical and solvent. By its constant and diffused presence in the intestines, the environment for micro-organisms was necessarily changed and the adaptability for their growth lessened. Fermentive and putrescent changes were controlled, and normal functions along the entire tract were re-established. The intestinal

toxines were not formed, or if some developed, they were dissolved by the petroleum and so carried off. Indican and etherial sulphates disappeared from the urine. There is little, if any, doubt, but that its germicidal effect is purely mechanical. Each micro-organism, of necessity, is dependent for its existence on the freedom and integrity of its avenues for taking in air and nourishment. Should these avenues be mechanically closed by petroleum oil, possessed of its peculiar qualities, the micro-organisms must of necessity die of starvation and suffocation. If it is possible to control the pathogenic micro-organisms of the intestinal tract by such innocuous mechanical means, a valuable addition will have been made to the treatment of chronic bronchitis, incipient and actively established phthisis.

The elimination of pathogenic germs and their products by this benign mechanical means from the intestines secures the conserving of nature's potent forces for undivided defence against disease activity in the bronchi and lungs. A close study of the results of its use indicates that it accomplishes all secured from cod-liver oil, and is wholly free from the many objections characterising that unstable animal oil. The action known as alterative seems to be equally as well secured by petroleum as by cod-liver oil. As nature always makes a more or less successful effort toward the cure of those diseases where an alterative is indicated, and as these same conditions are nearly all associated with disease, disorder, or functional inactivity in the intestines, the elimination of the latter conditions means undivided, and so stronger and more certainly victorious efforts in mastering disease activity in other organs. Chemical intestinal bactericides are all more or less absorbed, and the tax of their elimination is an added embarrassment. Nearly all are dissipated long before the entire course of the intestine has been traversed, thus differing from petroleum. Petroleum also possesses the valuable property of being an ideal solvent and dilutant for many remedies popular in the treatment of phthisis, such as creosote, the fixed oils, and nearly all volatile oils and alkaloids, and many chemicals. When this oil is used hypodermically and under antiseptic

precautions, no inflammation results and it speedily disappears, no physiological action being so far recognised. Theoretically it should be ideal as a fluid for compression of lung by intra-pleural injection. I know of no other substance of its approximate properties but what is chemically changeable and may be a food for animal and vegetable life. Many remedies, whose therapeutic effects are brought about by constitutional impression after absorption, have the quality of objectionable local irritant action when undiluted. The usual solvents and dilutants have decided effects not indicated or desired, namely, alcohol in various strengths, glycerin, volatile and fixed oils and fats, that may become rancid and are of difficult digestion. In many instances pure petroleum oil may replace such solvents, as it offers scarcely more objections than pure water. I have extensively given from five to ten grains of salol in two drachms of this oil four times a day, and reclaimed the oil from the fæces and found it to contain some salol, and its components phenic and salicylic acids. This proves the carrying of a chemical antiseptic and anti-ferment through the entire canal. Phosphorus may be dissolved in it for hypodermic administration. It is solvent for iodine, sulphur, beta, naphthol, naphthaline, menthol, thymol, camphor and iodoform. Oleic acid and oleates are soluble. By the addition of a little ether, chloroform, or oleic acid, the field of its power to dissolve is greatly increased, and includes many of the alkaloids. There is no evidence indicating that that which is removed from crude petroleum in refining has any medicinal virtue. Its range of usefulness as an assistance in combating phthisis is plainly apparent, both by its almost unique mechanical action and in association with other remedies. It is the best medium for the conveyance of remedies by nebulisation to the throat and bronchial tubes. It is the ideal remedy for the cure of all forms of constipation, and for treatment of tubercular infantile diarrhoea and *petit-mal* epilepsy from intestinal cause. The commercial offerings of petroleum in forms for internal use are not many.

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## A CASE OF MURAL ENDOCARDITIS.<sup>1</sup>

BY HAROLD WILLIAMS, M.D. (BOSTON).

### WITH PATHOLOGICAL REPORT.

BY J. LEARY, M.D. (BOSTON).

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THE following case is reported because of the rarity of the pathological lesion and because of the absence of murmurs, in spite of the extensive disease of the mitral valve.

The patient, a lady, rather inclined to obesity, aged 54, the wife of a physician, was cared for by her husband ; by Dr. R. H. Fitz, who saw her once or twice a week throughout her entire illness, and by me. The autopsy was made by Dr. Leary.

The first symptom began on December 22, when after a short walk, she was seized with an attack of angina pectoris, with dyspnœa, and with pain. She with difficulty reached her house and was put to bed, where she remained until her death, March 15. I first saw her on the evening of February 9. On this occasion she was in a condition of collapse, occurring after one of the attacks of dyspnœa, from which she had suffered at intervals since December. This collapse was almost complete, the face was ashen ; the temperature sub-normal ; the body bathed in sweat. No pulse could be felt at the wrist. The heart sounds were faintly audible. She was breathing in short gasps. She was having ether by inhalation. A subcutaneous injection of morphia was given and reaction set in. On the following day a careful physical examination of the chest was made, as follows : patient was lying on her left side, her breathing was shallow and laboured, but no orthopnœa ; there was retraction of intercostal spaces and also of interclavicular space. Percussion : flatness of both.

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<sup>1</sup> Reprinted from the Transactions of the American Climatological Association.

sides of chest below sixth rib behind. Dulness over lower lobe of left lung. Auscultation : numerous sonorous and sibilant râles over entire back, subcrepitant râles over area of dulness at the left lower base.

Heart : action feeble, apex pulsation not visible, no abnormal pulsation ; no thrills. Percussion : cardiac area of dulness enlarged slightly to left. Auscultation : heart sounds feeble, rhythm disturbed, no murmurs, no accentuation of pulmonic second sound.

The subsequent history of the case was a history of frequently occurring attacks of dyspnœa. The subsequent attacks were always without pain, and nearly always were predicted by patient. They began usually with a quickening of the pulse which soon became trigeminal and weaker and weaker, until it was lost at the wrist. The dyspnœa was intense. It consisted of a rapid series of gasps accompanied by a rhythmical movement of the right arm. Consciousness was retained throughout the attack. The suffering in these attacks was intense ; they were precipitated by the least movement ; by any attempt at examination of the chest ; by conversation ; by the most trifling emotional causes. They were but slightly amenable to the usual remedies, each drug relieving for a limited time, as if the reserve force aroused by its especial agency was quickly exhausted. Finally the attacks became almost continuous ; the decubitus changed from the left to the right side and the patient succumbed March 15. At no time were murmurs detected by any of the physicians in attendance.

The apprehension of the patient and the supervention of paroxysms of dyspnœa upon the least change of position greatly interfered with examination, but the diagnosis was made as follows : fatty heart with sclerosis of coronary arteries ; hypostatic pneumonia lower lobe of left lung ; hydrothorax.

*Autopsy.*—The description of lesions in organs other than heart, the arteries and lungs is purposely omitted. The changes in other tissues were all dependent upon the cardiac lesion, and were in no way remarkable.

Left pleural cavity contains a large amount of clear serous

fluid. Lung everywhere compressed, particularly lower lobe, whose tissue is dense and contains no air.

In upper anterior portion of lower lobe is a dark red wedge-shaped area of consolidation with its base 2 cm. in diameter on the pleura. At its apex was found a firm red clot filling a branch of pulmonary artery.

Right pleural cavity contains a smaller amount of fluid, and lung shows no gross signs of compression. In upper lobe of lung is a consolidated area, which occupies the greater part of upper portion of lobe. This area is discoloured dark blue and projects above surrounding lung substance. On section, lung shows a diffuse, very firm consolidation. Cut surface is bluish black and much blood may be scraped from it. At apex of consolidated area is found a long, firm, red clot, plugging one of the primary divisions of the branch of pulmonary artery supplying the lobe.

Sections of left lung show œdema and compression of alveoli. Some evidences of chronic passive congestion are shown by alveolar epithelial cells containing pigment granules, although the vessels of the alveolar walls do not in most cases contain blood.

Sections of right lung at base show a condition of marked chronic passive congestion with broncho-pneumonia.

No adhesions in either pleural cavity.

Pericardium contains no fluid ; surface smooth.

Heart 405 grammes (normal 250), found in diastole. All cavities dilated contain recent clots and fluid blood.

Heart muscle dark ; cut surface dull.

Left ventricle, the mitral orifice measured 10·5 cm. (Normal 10·4 cm.) Valve flaps show slight diffuse thickening. The chordæ tendineæ were generally thickened and shortened, in such a manner as to absolutely preclude closure of the valve. The papillary muscles are thickened and opaque at their apices, and several of the chordæ tendineæ are inter-adherent. Attempts to fold back the walls of the ventricle in order to inspect the interior, met with considerable resistance, on account of the tension of mitral segments. The endocardial surface of ventricular wall over triangular area,

having for its base the posterior flap of the mitral and bounded by lines converging to the apex, is thickened, white and very opaque. On section into muscle, a superficial layer, varying in thickness from .1 to .3 cm., white, firm and fibrous, could be readily moved about on the underlying muscle substance, to which it was united by loose attachments. This layer, in places, includes half the thickness of heart wall. In the lower portion of this area are two small, firm, dry, dull white clots, which are attached to the endocardium, filling folds between the columnæ.

Elsewhere the endocardium is translucent and its outline cannot be distinguished on section of muscle.

Ventricular wall. Left ventricle, .8 to 1.3 cm. in thickness (normal 1.1 to 1.4). Under area of endocarditis varies from .4 to .6 cm.

Right ventricle dilated. Tricuspid orifice 12.5 cm. (normal 12 cm.). Walls .2 to .4 cm. thick (normal .5 to .7?). Endocardium smooth, translucent. Valves show nothing abnormal.

Both auricles dilated and walls thickened. In right auricle are two old red clots in the folds of the pectinate muscle.

The left coronary shows nodular projections, throughout its course. Some of the areas are opaque, but none show calcification.

The lumen of the right coronary at about 2.5 cm. from its origin shows a sudden diminution in size, and is transformed into a fibrous cord, through which the canal could not be followed. This constriction extends for 1.2 cm. and suddenly stops, the lumen of the vessel immediately beyond being larger than the proximal portion. Except for this area of constriction the vessel shows a less degree of sclerotic change than does the left coronary.

Microscopical examination of branches of the coronary arteries shows arterio-sclerotic areas, many of which are in the proliferative stage, while most show degenerative changes in the new tissue.

Microscopical examination of the affected area in wall of left ventricle shows a proliferative endo-myocarditis. Most

of the inner layer of heart muscle has been replaced by dense fibrous tissue, and the opaque endocardial layer described is made up of this tissue with few islands of muscle substance. The muscle fibres show hyaline degeneration and many exhibit a separation of the primary fibrillæ. In the longitudinal sections segmentation of fibres, oftentimes with considerable displacement, is everywhere present. This change is more marked in the comparatively normal muscle fibres than in those imbedded in the inflammatory tissue.

Sections of ventricular wall from other areas, show a slight diffuse chronic myocarditis with muscular segmentation.

Aorta shows nodular arterio-sclerosis affecting principally the arch. Nodules are discreet and become fewer in number below the arch ; one focus at commencement of thoracic aorta is covered with a calcareous plate. Vessel has lost little of its elasticity, judged by gross tests.

Microscopical examination shows an arterio-sclerosis, which in most nodules is in the late stage of proliferation with hyaline degeneration of new tissue. Few patches show complete fatty metamorphosis beneath the endothelium.

Splenic artery is tortuous and generally thickened, with no prominent nodules. Endothelial coat granular.

Renal arteries show nodular thickenings, endothelium smooth.

Conclusions. We have to do with a generalised arterio-sclerosis, affecting vessels of medium and small size particularly.

The localisation of the extreme process in a portion of the wall of left ventricle is undoubtedly dependent upon the obliteration of right coronary artery, the area affected representing the distribution of the terminal branches of that vessel.

The muscular segmentation, which was found generally throughout heart muscle, has rarely been described except in connection with acute diseases. It has always been a question whether the process was not a *post-mortem* change. In this case the autopsy was performed only twenty hours *post-mortem* and the tissues immediately placed in fixing fluids.

The absence of cardiac murmurs is remarkable, as judging from the *post-mortem* picture, it would have been impossible for the flaps of the mitral valve to meet, unless systole were accompanied by extreme distortion of the left ventricle. The absence of pain is also a remarkable feature.

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## THE BLOOD CHANGES IN HIGH ALTITUDES.<sup>1</sup>

BY S. EDWIN SOLLY, M.D., M.R.C.S. (COLORADO SPRINGS).

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I DESIRE to give a brief synopsis of the blood investigations carried on under my direction in Colorado during the past year. The conclusions to be drawn from them confirm, in a general way, the observations made at similar altitudes; but the absolute proof that the total increase of red cells and hæmoglobin is real and not merely apparent, has not yet been obtained. However, I believe some further advance has been made in unravelling the tangled skein of causes and effects which combine to produce and modify these well known phenomena.

Dr. Judson Daland and I made some blood experiments upon the top of Pike's Peak, which showed great excess of red cells and hæmoglobin in two healthy men who had resided on the Peak for three months; also an increase in our own blood after ascending from Colorado Springs and a dropping back after our return. These matters Dr. Daland will, I trust, himself give you in detail. Perhaps the most valuable work done during the year was the examination of the blood of twenty-five healthy male students of the college in Colorado Springs. The blood was examined several times at the same time of day and the results averaged. The total averages were as follows:—

Place of observation, Colorado Springs; altitude, 6,000 ft.; time, 11-12 m., July, 1900; number of students, twenty-five; age, 22 years; duration of residence, eight years; number of red cells, 5,927'00; hæmoglobin, per cent. 101'7. The eldest student was 28 years and the youngest 17 years. The shortest period of residence was seven months, the longest twenty-three years. While all the students were apparently in good health, yet several were doing too much—taking care of furnaces, lawns, &c., as well as attending college, and

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<sup>1</sup> Reprinted from the Transactions of the American Climatological Association.

a few were over-working in athletics. In future enquiries the matter of exercise and social conditions must be more considered.

The length of residence appears to have a decided influence upon the degree of blood change. In four natives, and three who came to Colorado when under 7 years of age, the combined average number of red cells was 5,724·55 and the per cent. of hæmoglobin was 101·7, whereas in sixteen students who had resided in Colorado not more than three years nor less than seven months the averages were higher, 6,701·17 red cells and hæmoglobin, per cent. 102. This rather indicates that though the red cells and hæmoglobin averages higher among the natives of altitudes than those of low level climates, yet a too prolonged residence without change to sea level is not as beneficial as a shorter period of residence. In two students who had resided twelve years and eight years respectively, the red cells averaged 6,385·00.

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## A VISIT TO THE HEALTH RESORTS IN THE PYRENEES.

BY LEONARD WILLIAMS, M.D.

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THE second of the Voyages d'étude médicales aux eaux minérales de France took place in September, 1900. The district selected was the South West, which includes many of the best known Pyrenean stations and some of the watering places on the Bay of Biscay.

The object of these tours is to bring home to those who take part in them, the resources which France possesses in the matter of spas and mineral waters, resources which in recent years seem to some extent to have been lost sight of. The idea originated with Dr. Carron de la Carrière of Paris, who in spite of the conspicuous success of the first journey, was on this occasion rather nervous lest the practical attractions of the Exhibition would prove too strong for the academic allurements of the voyage. His fears, happily, proved groundless. When the roll was called at Luchon on September 2, it was found that no less than ninety-eight medical men, some of whom were attended by the ladies of their families, had put in an appearance. But the most remarkable feature of the party was not its size, but its composition from a national standpoint. Germany and Italy were unrepresented, but from almost every other country in Europe, including Turkey, Roumania and Finland, there came at least one medical man to take part in what proved to be a very agreeable and highly instructive tour. France was of course liberally represented, and supplied quite two thirds of the total, including the learned Professor of Therapeutics at Paris, Dr. Landouzy, well known to English physicians as having been the first to describe, with his colleague, Dr. Déjerine, the type of muscular dystrophy, the facio-scapulo-humeral, which bears their names. At each place Dr. Landouzy gave a short lecture on the composition of the waters of that place and the morbid conditions in which they had proved beneficial.

The majority of the spas in the Pyrenees are well elevated above sea level (Barèges is 4,000 feet), and most of their waters are sulphur waters of various temperatures, after the type of Harrogate, Strathpeffer, Llandrindod and others in this country. With very few exceptions these places are summer resorts pure and simple, the conditions in winter being so severe that all who can afford to do so, seek a warmer climate before the middle of October. The medical men who practise at these resorts, winter, many of them, in Paris, where, however, they do not practise; while others go to warmer stations in the neighbouring plains, such as Pau, or to seaside places like St. Jean de Luz, Biarritz and Arcachon, whither some of their patients follow them. The chief stations containing sulphur waters are Luchon, Bagnères de Bigorre, Barèges, Saint Sauveur, Eaux Bonnes, Eaux Chaudes, and Cauterets, and although the mineral constitution of the waters is by no means strikingly dissimilar, the various places appear to appeal to very different types of invalid. This was a fact upon which Dr. Landouzy was fond of insisting, and he explained the differences in the activities of the various waters by the differences not only in what he termed their anatomy, but also in what he called their physiology; that is, their natural temperature and their behaviour on exposure to the air.

Each of these places has its special interest to the visitor, not only on account of its climatic and other therapeutic advantages, but also on account of its historical associations. In all of them the scenery, as might be expected, is in the highest degree beautiful and imposing, and the local authorities are commendably active in maintaining and improving the roads and walks along which people make their excursions or take their exercise. Another feature common to them all, which impresses the foreign visitor, is the enterprise which those responsible have displayed in utilising the mountain streams for the purpose of generating electricity, which is used, not only for lighting, but also for propelling tramcars up ascents which, without them, would be in the highest degree tedious and costly to negotiate. Speaking generally, it cannot be said that sanitation, according to our

ideas, is the strong point of these stations. Some of them, Eaux Bonnes for example, are models of what, in such matters, a health resort should be, but in many of the others, even in their best hotels, the water-closets are such in name only, being of the old pan type, without any visible means for flushing. Their condition in many instances was unspeakably filthy, causing one to wonder how such houses can retain their guests even for a single day. It certainly seems inexplicable that in France, the birth-place of modern hygiene, the frequenters of health resorts should be so astoundingly unexact in the matter of house sanitation. When places like Pau and Biarritz were reached, which cater for a wider and therefore a more cosmopolitan community, a great improvement was apparent, both in the main drainage system and the sanitation of the individual house. The town of Pau itself is fully up to the standard of the best managed English towns.

Of the places which have mineral waters not belonging to the sulphur group, the most interesting were St. Christau, Argèles, Salies de Béarn, Biarritz and Dax. The first named is very charmingly situated in the Valley of Aspe, not far from Pau, and has weakly mineralised cold waters which contain some sulphate of iron and a small quantity of a very unusual constituent of natural mineral waters, namely, sulphate of copper. It has a special reputation in diseases of the skin, and Professor Gauchet, a Parisian dermatologist, who was one of the party, explained that he had had better results from St. Christau than from any of the sulphur spas. The place consists of the bathing establishment, the principal house and its satellite *châlets*, which form a sort of quadrangle in the centre of a park. The latter is used for tennis and other games, and *al fresco* entertainments. Argèles is another quiet little place on something of the same plan, but its proximity to Lourdes, in which the company was profoundly interested, deprived it of the measure of attention which it might otherwise have secured. Salies de Béarn and Biarritz both have strong brine waters. Those of the latter are brought in conduits from the neighbouring village of Briscous. Both

these places make a special feature, as indeed do many of the Pyrenean sulphur water spas, of the treatment of sterility in women and of rickets in children. In the matter of rickets it is quite comprehensible that the brine should have a beneficial effect, especially when we remember the advantages to be obtained from sea bathing in suitable cases. In the matter of sterility, one might be pardoned a considerable degree of scepticism were it not that other common salt waters, notably those of Rheinfelden, near Basle, have for a long time been credited with similar powers. The interest of Dax lies in its antiquity, its quaintness, and the fact that, alone among the places visited, it has mud baths. These are well administered in two very nicely arranged establishments, which in common with all those previously mentioned are fully equipped for the administration of every form of balneological procedure.

The two watering places, Biarritz and Arcachon, the one open to the Bay of Biscay, the other on a lagoon, are very characteristic of the well patronised French seaside resort. The crowded sandy beach and the mixed bathing by day, and the casino at night, are novel and attractive to the ordinary foreign onlooker, who, if he is fortunate at Biarritz, and does not read in bed with his window open, may escape the onslaughts of the particularly thirsty mosquitoes which, if he be credulous, he will believe have never been known there before. Arcachon, with its oyster beds and picturesquely garbed fisher-folk is well known to the French as a summer resort, and is very well patronised as such. We, in this country, know it best as a winter station, for which its aspect, its sandy soil and forest of pines seem to render it so very suitable. The winter climate, so far as this may be gauged by figures, is very similar to that of Bournemouth, than which it is perhaps a degree warmer.

As my object in writing these notes is to induce some of the Fellows of the Society to take advantage of these voyages, in order not only to become acquainted with the French Spas, but also to learn something from the methods of the practising physicians, which in many respects are rather different from our own, I may be pardoned if in conclusion I set down some

impressions of a purely personal nature concerning the tour and the manner in which it was conducted. And, first of all, let me, in order to dispel ideas which seem to prevail as to the attitude of the French towards our countrymen, express my appreciation of the polite and cordial welcome with which I was received on all hands. So far from any animus being apparent, it seemed, both at the Paris Congress and during the tour, as if the English physicians were singled out from among the others for special favour at the hands of their French colleagues.

From the standpoint of a method of spending a holiday, the tour has some advantages and some disadvantages. It is very far from being costly, the £13 which I paid "franked" me from September 2nd until the 15th, including board, lodging, travelling (always in a special train), in short, everything except what I chose to spend myself on souvenirs and such like. From Calais, or Dieppe, as the case may be, the "congressiste" from this country obtains a ticket at half price to the place of rendezvous, and he receives a similar ticket from the place where the company is dismissed to the point on the coast whence he started. The change from the ordinary life is very complete. The diet, the scenery, the company, the language, are all as different as they can be from what the ordinary Englishman is accustomed to, and even if he should be unfamiliar with the language, such a one need not fear that this fact will mar his enjoyment, for there are always several, if not many, in such a company whose English is excellent. After the inevitable stiffness of the first few days, the members drop into a holiday vein and camaraderie becomes the dominant note. And yet we worked hard enough. To rise at 5 a.m. and visit three stations in a day, with a probable reception by the mayor and corporation at each, constitutes a fatiguing day, and of such we endured many. Objections were raised on this head, especially towards the end of the journey, and it is probable that next year the programme will be so modified as to obviate the necessity for that "post-cure" which several protested they would have to undergo before returning to their work.

Another fact which gave rise to a good deal of criticism was that at some of the places we were housed in very different quarters. Of course, no one has any right to object to a certain measure of "roughing it," where this is necessary, as it may well be in a popular health-resort at the height of the season, but where, as it happened upon at least one occasion, there are good quarters standing empty, it is unreasonable to expect a body of medical men, several of whom are accompanied by their wives and daughters, to remain meek and unrebelling in quarters which are noisy and malodorous. Moreover, it is certainly unfair to the place. At Dax, where discontent on this point became vocal in many tongues, we were quite uncomfortable, and had I complied with the "orders" of the day and left the town with the rest, I should have retained a most unfavourable impression of the place. As it is, I regard Dax as a very charming and deeply interesting station; but then I stayed behind to examine it and to sample its mud-baths. It is probable that their experience of polyglot expletives on this occasion will be sufficient to deter the management from making similar mistakes in future. Next year's tour will take place in the neighbourhood of Aix-les-Bains, and to any of the Fellows who contemplate taking part in it, I will gladly furnish any information which is to be obtained.

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# BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL SOCIETY.

## COPY OF MINUTES.

THE general meeting (the first of new session), was held at 20, Hanover Square, October 31, 1900.

Dr. DOUGLAS KERR (Bath), who took the chair owing to the absence of the President, Dr. Ivor Murray, said :—Gentlemen,—In the absence of our retiring President, Dr. Murray, which, I feel sure you will all agree with me in regretting is due to ill health, I have been asked at the last moment, as one of the senior Vice-presidents, to take the chair to-night. I can only trust to your generosity to overlook my many shortcomings to fill his place.

The minutes of the last general meeting were read and confirmed.

The Treasurer's balance sheet was presented, and showed the satisfactory financial position of the Society. Resolved, that the balance sheet be adopted.

Dr. DOUGLAS KERR then introduced the new President, FREDERICK BAGSHAWE, Esq., M.D., F.R.C.P., J.P. (Hastings).

Dr. BAGSHAWE then returned thanks for his election and took the chair.

Dr. SANSOM : I beg to propose that this Society record its thanks to the out-going President, Dr. Ivor Murray. Dr. Murray has known well how to conduct the business of this Society with dignity, zeal and discretion. Himself a veteran, who had undergone the perils of the Indian Mutiny, and associated with our valued friend, Sir Joseph Fayrer, during the siege of Lucknow, he had learnt the lesson how to overcome difficulties, and so he filled this chair in the manner of a most able President. "Le roi est mort, vive le roi." The President who succeeds Dr. Ivor Murray is one of whom the Society may justly be proud. He will maintain its good name and foster its good work. We are thankful for the good work of the past, and I am sure we all join in hearty thanks to our outgoing President, Dr. Ivor Murray.

# THE BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL SOCIETY.

Statement of Receipts and Payments for the portion of the year ending September 30, 1900, made out from May 1, 1900, the date when the books were handed over to the present Treasurer.

RECEIPTS.		PAYMENTS.	
	£ s. d.		£ s. d.
To Balance in Bank, May 1, 1900	97 2 0	By Reporter	6 6 0
" Subscriptions	117 4 0	" Secretary's Petty Cash, &c.	4 3 4
" Arrears of Subscriptions, owing prior to October 1, 1899	45 3 0	" Accountant	2 2 0
" Donation from the President (Dr. Ivor Murray)	5 5 0	" Printing	40 0 0
" Advertisements	36 13 9	" Journal Secretarial Work	14 0 0
" Sale of Journal	4 10 0	" Library Shelves	2 15 6
		" Music at Conversazione	5 8 0
		" Refreshments at Conversazione	5 0 0
		" Sundries	3 9 10
		" Cash by Advertisements and Sale of Journal, credited to Bale, Sons & Danielsson, Ltd.	41 3 9
		" Balance at Bank	181 9 4
	<u>£305 17 9</u>		<u>£305 17 9</u>

## STATEMENT OF LIABILITIES AND ASSETS ON SEPTEMBER 30, 1900.

LIABILITIES.		ASSETS.	
	£ s. d.		£ s. d.
Secretary's Petty Cash Expenses	9 0 9	Subscriptions in arrear on Sept. 30, 1900	49 7 0
Treasurer's "	3 11 5	Cash in bank	181 9 4
Sundry Creditors	9 15 10		
Printer (Journal Account)	121 8 0		
" (General Account)	36 14 11		
	<u>180 10 11</u>		
Balance, being surplus of assets over liabilities	50 5 5		
	<u>£230 16 4</u>		<u>£230 16 4</u>

Audited and found correct, Oct. 26, 1900.

Signed, { A. L. ACHARD.  
W. S. HEDLEY.

Dr. BOWEN DAVIES (Llandrindod), said : I have much pleasure in seconding a vote of thanks to our retiring President, Dr. Ivor Murray. I am sure we are all sorry to miss him here to-night, and hope he will quickly and thoroughly regain his usual health and soon be able to undertake the long journey from the North and be amongst us again on many occasions during the coming session. The genial way in which he has occupied the presidential chair the last year has endeared him to us all.

Dr. EWART proposed a vote of thanks to the Honorary Treasurer, to whom the Society was under more than the usual obligation. The responsibility of managing the finances of a medical society is never a sinecure, but in this instance it had been a task of considerable labour. The successful manner in which this task had been performed was shown in the balance sheet, which disclosed a sound and encouraging financial condition. A vote of thanks was also due to the auditors who had been able to ratify the good work performed in the service of the Society.

Dr. LEON (Sidmouth) seconded a vote of thanks to the Hon. Treasurer and Auditors, and complimented the Treasurer on the efficiency he had displayed in the control of the finances of the Society.

Dr. CLIPPINGDALE proposed and Dr. WILLS (Bexhill) seconded a vote of thanks to the Council.

Dr. WARD HUMPHREYS proposed a vote of thanks to the Editors of the Journal.

Dr. LATTE (Folkestone), in seconding the vote of thanks to the editors, expressed his high appreciation of the efficient manner in which they fulfilled their duties. The Journal was the great bond of union between all the members. As a medium of instruction it was invaluable, and to those members who read papers or took part in discussions, it was gratifying to see their due publication in its pages.

Dr. LEONARD WILLIAMS replied.

Dr. ROBERT LEE proposed and Dr. FELKIN seconded a vote of thanks to the Librarian, and Dr. MORGAN DOCKRELL replied.

Dr. BANNANTYNE (Bath) proposed, and Dr. PRUEN (Cheltenham) seconded, a vote of thanks to the Secretaries, and Dr. SHIRLEY JONES (Droitwich) replied on behalf of himself and colleague, Dr. Sunderland.

ORDINARY MEETING, OCTOBER 31, 1900.

Dr. DOUGLAS KERR introduced the new President, saying :  
Gentlemen,—It is now my pleasant duty to introduce to you our President-elect for the ensuing year, Dr. Frederick Bagshawe, of St. Leonards. I heartily congratulate the Balneological Society in having secured as its next President a gentleman so thoroughly qualified both by professional ability and social standing worthily to uphold the traditions of this chair. Few words are necessary in the way of introduction of a gentleman so well known to the members of the medical profession and to this Society, in which he has always taken so lively an interest. The high standing which Dr. Bagshawe holds in the profession, and the civic honours which have been showered upon him, speak for themselves. Dr. Bagshawe was educated at Cambridge, taking the B.A. degree in 1861, the M.B. in 1863, the M.D. in 1865, and is also a Fellow of the Royal College of Physicians of London. He is a member of many of the leading medical societies, especially of the Society under whose roof we hold our meetings, the Royal Medical and Chirurgical Society ; he is Physician to the East Sussex Infirmary, and late Physician to All Saints' Convalescent Home for Diseases of the Chest. He has taken a deep interest in the working of the South Eastern Branch of the British Medical Association, of which he has been constantly a member of Council, and once its President. Civic honours have been thrust upon him, and in the midst of his busy professional career he has worthily discharged the duties of a J.P. of the county of Sussex, while his fellow townsmen showed the esteem in which they hold him by his appointment of first Mayor of Greater Hastings. With these few and very imperfect words of introduction, gentlemen, allow me to introduce to you our future President, Dr. Frederick Bagshawe.

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FREDERICK BAGSHAWE, Esq., M.D., F.R.C.P., J.P. (St. Leonards), then took the chair.

Twenty-six candidates were nominated, and the following candidates were elected by ballot :—

George Trustram Watson, M.A., M.B., Hastings.

Stanley Noble, M.D., M.R.C.S., L.R.C.P., Brighton.

John W. Batterham, M.B., B.S., F.R.C.S., St. Leonards-on-Sea.

The PRESIDENT then delivered an interesting and instructive address on "Some Points in the Development of Seaside Towns."

Dr. ROBERT LEE proposed and Dr. WARD HUMPHREYS seconded a vote of thanks to the President for the address.

Dr. BAGSHAWE thanked the Society for the great honour conferred on him in electing him President of the Balneological and Climatological Society. He felt the need of the sympathy and assistance of the Fellows in enabling him to fulfil the duties imposed upon him. He was anxious to maintain the dignity and professional status of the Society to the fullest extent. He had the interests of the Society at heart, and nothing should be wanting on his part to enable it to pursue the field of usefulness on which the Society had entered. The work his predecessors had accomplished inspired him with hope and assurance for the future.

In reply to the vote of thanks for his address, Dr. BAGSHAWE said he had great hesitation in bringing before the Fellows a subject not bearing directly on climates or baths. He thought questions on local and comparative climatology had already occupied so large a share of attention that he might be allowed to go somewhat outside the ordinary field. For instance, the open-air treatment of tuberculosis had claimed so much attention that it was hardly fitting to bring it forward again. His attention had recently been called to the subjects he had dealt with, and he thought they might prove not uninteresting for the consideration of the Fellows. He begged to offer his best thanks for the kind way in which his observations had been received.

# BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL SOCIETY.

## COPY OF MINUTES.

THE ordinary meeting was held at 20, Hanover Square, Friday, December 14, 1900. Dr. Symes Thompson (owing to the absence of the President, Dr. Frederic Bagshawe) in the Chair.

The minutes of last meeting were read and confirmed.

The following candidates were nominated for ballot at the next ordinary meeting :

Octavius Hall, L.R.C.P., L.R.C.S., Devonport.  
John Michael Nicholls, L.R.C.P., M.R.C.S., St. Ives.  
Walter Harry Dodd, L.R.C.P., L.S.A., Brighton.  
Gordon Sanders, M.D., C.M., Cannes.  
Norman Hay Forbes, F.R.C.S., L.R.C.P., Tunbridge Wells.  
Andrew Murdoch, M.B., C.M., Bexhill.

The following candidates were elected by ballot :

Edmond Frost, M.B., Eastbourne.  
Charles Begg, M.B., C.M., Bath.  
H. Geo. L. Allford, L.R.C.P., M.R.C.S., Hastings.  
Robt. Derwent Parker, M.A., M.D., Buxton.  
Wm. Henry Symons, M.D., D.P.H., Bath.  
Chas. Walker Brisley, M.R.C.S., L.R.C.P., St. Leonards.  
Miles H. C. Atkinson, M.D., M.Ch., Leamington.  
A. Hill Joseph, M.D., Bexhill.  
Fredk. Cecil Forster, M.R.C.S., L.R.C.P., Bath.  
Wm. Wilberforce Dunkley, F.R.C.P., Guernsey.  
W. R. Bates, L.R.C.P. & S., Ilkley.  
Richard Lowther, M.D., M.R.C.S., Grange-over-Sands.  
A. Warwick Brown, M.B., C.M., St. Leonards-on-Sea.  
W. Crawford Watson, M.D. (Edin.), Harrogate.  
John J. Hemming, M.R.C.S., L.S.A., Margate.  
W. J. Ritchie Simpson, M.D. (Edin.), London.  
T. F. Gardner, M.R.C.P. & S., Bournemouth.  
Ernest Symes, M.R.C.S., L.R.C.P., Scarborough.  
A. G. S. Mahomed, M.R.C.S., L.S.A., Bournemouth.  
Francis R. B. Bisshopp, M.D. (Cantab.), Tunbridge Wells.  
J. Wigmore, M.D., R.U.I., Bath.  
F. M. Pope, B.A. & M.B., M.R.C.P., Leicester.  
Charles Pinkerton, M.D., Southport.  
Forbes Fraser, F.R.C.S., L.R.C.P., Bath.  
C. O. Hawthorne, M.D., M.R.C.P., London.  
G. William Hill, M.D., London.  
Hugh James Lloyd, L.R.C.P., L.S.A., Barmouth.

Letters of regret at unavoidable absence were read, amongst others, from Surgeon-General Muir, Colonel Johnston and Major Macpherson of the A.M.S., Professor McLeod of Netley, Major Ross, Dr. Annett of Liverpool, &c.

Major Ross, in a letter to the lecturer, said : " My view on prevention of malaria is that our principal malarious towns should be kept as well drained as possible, and that municipalities should keep mosquito-killers ; also that governments should issue instructions to their sanitary officials to take steps in these directions."

Dr. Annett, a member of the Liverpool Malaria Expedition, wired : " Cannot too strongly urge segregation of Europeans and efficient surface drainage as only measures against malaria in West Africa. Quinine, mosquito-proof houses, &c., absolutely impracticable."

The CHAIRMAN said he would like to mention, before calling on the author of the paper, that there had recently taken place, at a meeting of the Royal Medico-Chirurgical Society, a discussion on malaria, at which several distinguished members were present, whom it was hoped would have been present that evening. Dr. Sambon and Dr. Lowe, whom they had also hoped to see, found that they were unable to come. He was sure the paper they were about to hear would be an interesting one, and he hoped it would be followed by a good discussion. If there were any visitors present, he hoped they would consider themselves as members for the time being and take part in the discussion.

Dr. Arthur Waddell (Potter's Bar) read a paper entitled, " The Suppression of Malaria." The following Fellows took part in the discussion : Drs. Symes Thompson, Surgeon-Major Black, Fortescue Fox, Tregelles Fox, Felkin, Pruen (Cheltenham), and Morgan Dockrell.

Dr. Waddell replied.

# NAMES OF TOWNS WHERE FELLOWS RESIDE.

## ENGLAND.

ASHBY-DE-LA-ZOUCH. — Williams,  
Chas. R.

BARMOUTH.  
Lloyd, Hugh J.

BATH.  
Bannatyne, Gilbert A.  
Bayliss, R. A.  
Begg, Chas.  
Bowker, George.  
Cowan, Frederick.  
Ellis, W. McD.  
Forster, C. F.  
Fraser, Forbes.  
Kerr, J. G. Douglas.  
King, Preston.  
Lace, Frederick.  
Lowe, T. Pagan.  
Mackenzie, Alex. L.  
Symons, W. H.  
Walsh, Leslie H.  
Wigmore, J.  
Wohlmann, A.

BEXHILL-ON-SEA.  
Wills, Joseph P. B.  
Joseph, A. H.

BIRCHINGTON.—Harris, James S.

BIRMINGHAM.  
Foster, Sir Walter (Hon.)  
Griffiths, Chas. Thos.

BLACKPOOL.  
Kingsbury, Geo. C.  
Molloy, Leonard.  
Rhodes, T.

BOURNEMOUTH.  
Alderson, F. H.  
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INTRODUCTION OF DISCUSSION ON ANÆMIA  
AND ITS THERAPEUTICS.

BY PROFESSOR CLIFFORD ALLBUTT.

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GENTLEMEN,—Your courteous Chairman, Dr. Fortescue Fox, has led me into temptation. To be invited to address this Society, of whose kind hospitality I have already had happy experience, was a temptation which I ought to have resisted. I ought to have known that I am not especially qualified for my present duty, while among my hearers there are many who have personal experience of climatic and hygienic influences in anæmia to which I have but little pretension. On the other hand I am less alarmed by my position to-night when I realise how little any of us know of the subject we are to discuss; and perhaps none of you may feel able to cast a stone at me. I am surprised to find how little has been recorded on the subject I have the honour to introduce to you, and of that little how small a fraction is based upon observations having pretensions to scientific method.

The methods of treatment to which we are to confine our-

selves to-night are the non-medicinal, if I may express myself in negative terms. Subsequent speakers will therefore be kind enough to see that the large subject is thus brought within manageable dimensions. We shall not transgress the limits of the treatment of anæmia by non-medicinal means. When we turn to the other member of our title and consider what latitude we are to give to the name anæmia, we shall not find our course so easy. To consider the treatment of anæmia is as vague an intention as to take in hand, let us say, the treatment of cough. The name anæmia is easy, and makes no demands upon us; it slips on readily like an old pair of slippers. But we must be a little smarter; we must restrict the meaning, or the designation, of the word a good deal if we are to make much of our subject. Anæmia means of course defect of blood, whether as a whole or in respect of certain parts or qualities. To our forefathers who invented the name, the conception of anæmia was a simple one; they saw much of losses of blood, artificial and otherwise, and they noted broadly certain appearances in patients subjected to such losses; for instance, pallor of the mucous and cutaneous surfaces, dyspnœa, languor of functions, and so forth. All persons thus affected are superficially alike, and were classed together, at any rate in respect of the main features of such disorders, as in like manner all persons presenting another change in superficial colouring were classed together under the name of jaundice. Anæmia to-day presents to us as confused a conception as jaundice. But the histologist, who long ago betook himself to the liver, and by investigation of the morbid variations of its tissues distinguished not one but many which might be accompanied by jaundice, some time later betook himself to the blood, and is discovering in this tissue likewise that anæmia is consistent with many kinds of change in its constituent parts; the blood, he tells us, is a complex body, and as its complexities in health so are its variations in disease. Such investigations have reached their highest present attainment in those demonstrations of Ehrlich with which all my hearers are more or less familiar. The blood then suffers in many more fashions than by mere ups and downs in quantity or colour; by the deviation of this element or that of its constitution it may undergo an indefinite variety of changes, many

of which may be tracked out by appropriate methods, such as the staining of blood films. By such methods, by certain chemical tests, by comparison of the specific gravities of its constituents as well as by certain biological tests (sero-therapy and immunity), we find that anæmia is of many kinds, kinds often very far apart in nature; and to these we have appropriated new names, such as pernicious anæmia, leucocythæmia, toxic anæmias of various kinds, as in the incubation of fevers, in the course of pneumonia, in the cancerous and tuberculous cachexias, and so forth; to enumerate all of which I will not detain you. I will assume that it is not the purpose of the Society, to-night at any rate, to undertake the consideration of most or even of many of these diseases or morbid changes, and I propose to confine our attention almost entirely to the so-called simple anæmias as opposed to the hæmolytic anæmias; though I know how soon further research may disintegrate the class of simple anæmias, and break it up. By simple anæmias I mean at present the anæmia of hæmorrhage, the anæmias of convalescence after acute diseases and chlorosis; changes in the structure of the blood known to be toxic or hæmolytic, we must for the present omit. And with your permission I will begin with chlorosis. If we consider this disease carefully we shall be in a position to extend our conclusions to the simpler anæmias without making much mistake.

But before we attack the immediate question a few words must be devoted to methods. Our task is the harder in that recent research is taking from us even the little knowledge we thought we had. For many years we, or our clinical clerks for us, have been industriously engaged in making blood counts. Now, of the value of blood counts in the more eccentric deviations of the blood from the standard of health I am at present not called upon to speak; we are to leave such perversions out of account. But even if we regard for the moment red corpuscles only, as in chlorosis, for instance, the value of blood counts, if not depreciated beyond all usefulness, proves to be far less directly interpretative than we had supposed. The careful observations of many observers are demonstrating to us, that the ordinary drop of blood, taken in the usual way, is not by any means a constant mean specimen of the blood in the

body. Practically all such specimens are taken from the cutaneous surface, and it turns out that these surfaces offer blood to the puncture under circumstances of much inconstancy. The superficial drop is not indeed usually an average specimen of the whole blood. In particular, it is found that many conditions influence the proportion of red corpuscles in such a drop; among such conditions being those, and they are many in number, which expand and contract the peripheral vessels, and those which control the circulation of the lymph, such as massage. Muscular exercise causes an absolute diminution of the red corpuscles, which massage does not; and mental exertion or worry do likewise, so that for persons who work by day there is a recovery of hæmoglobin and corpuscles during the night, and during the day in those who work at night and rest in the day-time. A slight contraction of arterioles in the area selected will soon be followed by a diminution of the proportion of red corpuscles to a given bulk of the blood contact. Again, the time of day or night at which the puncture is made has to be taken into calculation; though, as there is a certain constancy in the diurnal periods of the corpuscular changes, this calculation may not present an insuperable difficulty. I will not delay you by pursuing these sources of fallacy into detail; it will suffice to say that all observations taken on the older unchecked methods are a shaky foundation for argument; nay, indeed, that authors, such as Professor Wright and others, condemn the ordinary counts of red corpuscles as useless or misleading. In chlorosis we have hitherto been wont to assume with some positiveness that the absolute diminution of the red corpuscles are not only impoverished individually but also in number; yet even this modest conclusion is now depreciated by many observers, among whom I may put Haldane and Lorrain Smith in the first place. Here at a blow we are deprived of a large part of our common-place explanation of the pallor of the skin and mucous membrane in chlorosis, of the dyspnœa, of the languor of the general functions, and so forth.

Let us turn our attention for a moment from the red corpuscles to the mass of the blood; a condition which has held us in doubt for many years. All clinicians, if I may speak

for myself, have felt that the estimation of the mass of the blood—probably a large fluctuating bulk—would prove to be a very important factor in pathology; yet no means even of guessing at this factor was known. My late friend Roy, whose ingenious methods and the direction of whose acute and powerful mind were devoted to such subjects, often declared, in answer to my questions, that he had no notion whatever how to measure, or even to guess at this factor. And he did well to recognise the limits of his knowledge, as it turns out that the physiologists were largely in error in their estimate of the blood mass. It is to Haldane and Lorrain Smith that at last we owe a very clever method of ascertaining this factor; and I cannot see any error in their method, though I speak not as an expert. Suffice it to say that from their experiments it turns out that the colour of a specimen of blood may be taken as an accurate measure of its oxygen capacity, and that this capacity may be determined by reference to a standard blood of known oxygen capacity. Thus by administering a known volume of carbonic oxide, and then determining by the carmine method the percentage to which the hæmoglobin has become saturated with carbonic oxide, we can estimate the volume of carbonic oxide capable of being taken up by 100 grammes of blood, we can that if we determine at the same time the volume of carbonic oxide (or, what is exactly the same, the volume of oxygen) capable of being taken up by 100 grammes of blood, we can calculate the total mass of blood in the body. Now, according to commonly accepted estimates the weight of the blood in man is about one-twelfth (say 8 per cent.) of the body weight; but by Haldane and Smith's method this estimate turns out much too high; the blood mass on a mean of fourteen persons turns out to be no more than 4·9 per cent., or 1 in 20·5 of the body weight. But there is much reason to believe that the mass of the blood in all individuals is a very variable quantity; and that such a variation may be of importance in practical medicine is indicated by the use of such words as *hydræmia*, as if with an anticipation that the bulk of the blood may be diluted without necessarily any absolute diminution of the solid contents. In such a case a stationary quantity of, let us say, red corpuscles would become a relative diminution; the same

number would be distributed over a larger area. Moreover, leaving for a moment hæmoglobin values out of calculation, even in the functions of the body increase of blood bulk would be virtual poverty in red corpuscles; because, in any given work of blood distribution, these corpuscles would be fewer. For the same work, for example, the lungs would hold in the same quantity of blood fewer corpuscles, the heart for equal bulks would distribute fewer corpuscles to the several areas of the system. Under such conditions we should expect, what is the case, that the lungs would be unsatisfied, and other organs likewise; and the heart would therefore be called upon to deliver larger parcels of blood that the delivery of red corpuscles might reach the normal amounts. Now it seems that this is the state of things in chlorosis, that the bulk of the blood is considerably increased, and that such is the explanation of the dyspnoea, the palpitation, and the not infrequent dilatation of the heart therein, and if so the therapeutical problem will be not so much to multiply the red corpuscles as to diminish the plasma in which they are more extended. Pull the blood together and there will be corpuscles enough, the heart will not have to deliver the excessive parcels of blood to the lungs and elsewhere, and its dilatation will recede, in so far as it may have been due not to malnutrition but to need of greater temporary capacity. How iron cures chlorosis is a problem of empirical medicine which grows more obscure the more it is studied; even if the iron increase the red corpuscles the boon may be a doubtful one, seeing the excessive bulk of the blood may remain as before; it seems certain that the iron is not used to build up hæmoglobin, and indeed, iron may cure chlorosis without any appreciable increase in total hæmoglobin. On scientific grounds it would seem that our therapeutical purpose in chlorosis should be to diminish the excess of plasma by whatsoever proper means. To-night we have to think chiefly of climatic means, and to this purpose some extensive and interesting experiments are published in a recent work of Dr. George Oliver, which he was so kind as to present to me a short time ago. Among other series of experiments, all of them most industrious and full of practical interest, Dr. Oliver describes some observations which he made on the blood at Davos, at

Arosa, and at Helouan in Egypt. It is well known to all here present that at high altitudes an increase in the count of red corpuscles is uniformly reported. The increase begins soon after arrival, practically at once; it is considerable—say 10 per cent.—and is well maintained during the stay at the high altitude. There is some increase in hæmoglobin also, but in less proportion. On descent the blood soon falls back to its former condition. The explanation that this increase is due to increased construction of red corpuscles in order to compensate the tenuity of the air, had by other observers been proved untenable. The promptitude of the phenomenon for one thing makes this explanation very unlikely. Dr. Oliver brought his experiments to bear on this point, and arrived at the conclusion that the increase of red corpuscles is but apparent, the increase being relative and proportionate to the diminution of the plasma by transpiration in a dry air. This observer demonstrated that with like dryness at low altitudes, as at Helouan, the same apparent increase took place; in fact, Dr. Oliver almost concludes that the apparent number of red corpuscles will vary, as the bulk of plasma varies, with the varying humidity of different climates, and indeed of the same locality.

Nature, to speak figuratively, seeks indeed to maintain a mean bulk of blood as she seeks to maintain mean blood pressures; but about this mean the oscillations are wide and frequent, as the intake and output of water fluctuate largely. For instance, Dr. Oliver publishes a diagram showing a large reduction of plasma after a Turkish bath. Dr. William Hunter and Professor Sherrington have published corroborative observations in other ways which I need not quote at present. In anæmia after hæmorrhage, on the other hand, there is no increase of plasma.

How in chlorosis the plasma gathers this increase is the next object of our investigation. As yet no explanation appears. Some excess of lymphocytes suggests that it may be due to a washing out of the lymph channels into the blood-vessels; but this explanation seems too casual and temporary a factor. In chlorosis the increase of plasma seems to be in direct proportion to the severity of the disease, its specific gravity being up

to the level of that of normal blood (Lloyd Jones). If then we are led to think that the way of cure of chlorosis is to a considerable extent by reduction of the bulk of plasma we shall not send our patients to consume waters which may well add to this bulk, but we shall send them to dry climates, whether high or low, where, by transpiration, the bulk of the circulating fluids may be reduced. While on the subject of high altitudes I may remark that the anæmia of tuberculosis is not the anæmia of plasmatic redundancy, but of paucity of red corpuscles in the normal or abnormal total blood mass; though of course a chlorotic may become tuberculous, an event, by the way, which, in my experience, is less common than is generally supposed. It would seem then that if tuberculous patients find restoration of the blood at high altitudes it is by some different process than in the case of the chlorotic; probably by some stimulus to tissue building. As a call on tissue building is not a mere physical process as is the reduction of plasma, we ought perhaps to consider in each case whether the individual be of vigour enough to respond to this demand before we send him to such a locality. Be this as it may, in cases of doubtful vitality it may be desirable to advise a gradual advance to the height intended. In any severe chlorosis the patient we know to be unequal to the destruction of corpuscles consequent on the day's work, moderate as it may be, and complete rest in bed becomes an essential part of the first stages of treatment.

My allotted time forbids me to do more than indicate the lines on which the discussion shall run; and it is evident from what I have already said that before advising this climate or that, these baths or those, in the treatment of anæmia, it is important to ascertain in the first place the nature and kind of the anæmia under advice. In cases in which the plasma is *under* standard bulk, or at any rate not above it, the patient will not need conditions tending to reduce its bulk still farther. In cases of subnormal plasma Dr. Oliver says dry massage and Turkish and Russian baths are physiologically contraindicated; and he does not think that in these cases, often found in neurotic persons with low blood pressures, and I may add suffering probably from chronic glandular inactivity, of which habitual constipation is a prominent indication, high altitudes

are to be recommended. Preference should be given to watering places near or on the sea level; warmth, both in air and baths and clothing, is rather required; and as a remarkable corroboration of my opinion that these persons are depressed by defective glandular activity throughout the body, not of the bowels only, Oliver has found that they answer to mercurials and salines, and to the use of mineral waters of the muriated class. At first sight such means do not seem likely to restore the plasma to full bulk, or to preserve it from farther diminution; yet so complex a structure is the human body, we have to take into consideration not direct effects only but also the indirect; and it is probable that the deobstruent means described, if for the moment tending to expel fluids, set up an increased absorption which more than compensates the removal, and establishes a freer access of blood, a lowering of lymph pressures and a higher degree of succulency in all the tissues. I may add that in these dry anæmics I have noticed that the skin loses its pliability, and under slight lesions and infections tends easily to fall away into eczematous states.

In the Addenbrooke's Hospital during the past year or longer, two verandahs have been fitted up for the open-air treatment of disease; not especially, not even chiefly, for phthisis. My able colleague, Dr. Humphry, has taken great interest in this part of the clinical work, and has arrived at some important results. Among the diseases thus treated, anæmia in its various forms has contributed no small number. In many cases of hæmolytic anæmia Dr. Humphry has attained considerable success; but he has been disappointed with the results in chlorosis. Within my own experience two private patients suffering from splenic leucocythæmia have been so treated, and both have derived much benefit; in one case this method has been in use for about eighteen months, at a high altitude. The patient, who is well aware of the gravity of the disease, is convinced, nevertheless, that under no other conditions does he hold his own so well, and he finds also that departure from them is followed by deterioration. I suggest therefore to the Society that hæmolytic anæmias, which are most or all of them toxic, may be advantageously treated by open air, especially in high altitudes, though I may remind you again that approach

to these altitudes should be made gradually, lest the blood production should be strained beyond its powers of reaction. It is remarkable in respect of chlorosis that the good effects of open-air treatment are not more quickly visible, for I find in Hirsch that while chlorosis flourishes in all climates and at all elevations, that it has manifested itself of late for the first time in regions in which it was before unknown, as, for instance, in remoter parts of Scandinavia, in proportion as the women have been withdrawn, under the influence of softer manners, from out-door labour. However, this does not seem true for the eastern counties of England, where chlorosis is abundant enough, and in districts where the people are all more or less open-air workers. In our neighbourhood the disease, in the opinion of such old medical residents as the late Sir George Humphry, seems to prevail in certain villages; which would seem to suggest that the malady is rather one of hereditary propagation, for in these fen districts there has been much inter-marriage, at any rate in the generations before drainage and the advent of railways, when the fen settlements were almost isolated. I have looked up standard authors and journals on the treatment of anæmia at spas, and in various climates, and am disappointed to find scarcely anything of permanent value; we all know that iron water, like iron in other forms, does good in anæmia, but of careful comparison between the effects of iron springs at a Spa and of Blaud's pills at home, I find nothing. My own experience is that every now and then we come across a case of chlorosis in which home treatment by iron seems to fail, and the few of such patients—for such cases are rare—whom I have been able to send to Switzerland certainly did very well there without giving iron at all, which corroborates Haldane and Smith; but such vague reports do not merit your attention. That iron in a less aqueous form than as administered at Spas is better adapted for chlorosis I have said already.

Dr. LEON (Sidmouth): I have listened with very great interest to the remarks of Dr. Clifford Allbutt on the subject before us to-night. It is only with great diffidence that at the request of our Chairman of Council I have consented to make a few observations on chlorosis, the so-called green-sickness,

as it exists in the humid and mild climate of the South Devon valleys.

The relative humidity of the Sidmouth Valley from observations taken at 9 a.m. over a series of years is 83 degrees, which as we know is considerably higher than that of most parts of the country. No one (as a casual visitor) can be long in the district without being struck by the large number of cases of chlorosis. Perhaps the majority of sufferers are domestic servants, but many work in shops and not a few live at home. They are for the most part well (though I do not say suitably) fed; and unlike the sufferers in our great cities, have plenty of air and light. Our Sidmouth Valley with its side valleys is surrounded by hills from 500 to 800 feet in height. In this hilly country the patients come from cottages and houses at various altitudes, but almost invariably the residences are at the bottom of the valleys, that is to say, in their dampest part. The symptoms are those with which we all are acquainted as typical of the disease. But it does seem anomalous in an apparently healthy country district to see a heavy-eyed apparently well-nourished girl with the greenish-yellow complexion instead of the rosy cheeks one would expect. I think pyrexial attacks with vomiting are more common than usual. One patient has from time to time a temperature of 104 to 105 degrees in these attacks. There is only one other fact I wish to allude to and that is the deplorable condition of the teeth of the youth of Devon. There can be but little doubt that this is a factor which contributes to the anæmic condition.

With regard to the general pathology of chlorosis there is strong evidence that the theory mentioned by Dr. Symes Thompson and Dr. Leonard Williams, in 1899, in a discussion of this Society, is the correct one. At the usual age of the chlorotic patient metabolism should be most active. In a climate with a relatively high degree of humidity, temperature is more equable owing to radiation being less. Under these conditions the chemical changes always at work in the living body proceed more slowly, the hæmoglobin of the blood is manufactured in less quantity, and for want of oxygen all the body tissues suffer. Under these external circumstances the first to manifest disease would be those whose metabolic

activity should be at its greatest, that is the class of girl attacked by chlorosis. Now this theory can be strengthened by several pieces of evidence.

In the first place the condition is most marked in those young women whose occupation is of a sedentary nature, *i.e.*, whose metabolic activity is reduced to a still greater extent.

In the second place an outdoor exercise like cycling increases the circulatory activity and the functional powers of all the organs. The chest expands, the lungs contain more air, the red corpuscles are supplied with more oxygen to carry to the tissues. Metabolism is promoted. I have found outdoor exercise, especially cycling, one of the best preventives, and in mild cases one of the best adjuncts to treatment of the anæmic condition. The domestic servant is as a class the greatest sufferer from chlorosis. Her work is indoors; the kind of labour insufficiently vigorous. In her spare time she has tea with a friend or sits with her young man. Healthy exercise is as a rule unknown to her. Two of my own servants were constantly requiring treatment for anæmia. They were persuaded to cycle in their spare time. I have never had to treat them since.

Thirdly, what one may call the Epsom salts treatment rids the human manufactory of its refuse heap of waste products, and so makes room for more rapid production.

In the fourth place, pregnancy puts an end to the chlorotic condition. It is not so certain that the mere fact of sexual intercourse without pregnancy has the same effect. Probably at no other time are the vital functions of a woman more active than during pregnancy.

In the fifth place, cases of anæmia subsequent to Bright's disease, or certain forms of cardiac trouble, do particularly well in an equable climate of high relative humidity. In those cases, in contradistinction to the anæmia of chlorosis, the wheels of the machinery of life must work as slowly as possible. Cases of Bright's disease amongst the natives of the valley of Sidmouth are exceedingly rare. Cases of renal disease sent down for treatment and climate do remarkably well.

With regard to the treatment of the chlorotic condition, practically all cases improve most satisfactorily and rapidly with

iron. In dyspeptic subjects the addition of the glycerole of pepsin with HCl to the perchloride of iron is useful for a time. The point, however, I would like to emphasise with regard to the management of these patients in South Devon climate is that with suitable precautions many cases may be prevented from relapsing. Active exercise in spare moments on the hills (not in the valleys), morning baths, suitable dieting, attention to the condition of the teeth, will frequently prevent relapse into the anæmic condition.

To sum up briefly I have ventured to bring before the notice of the Society the following points:—

(1) Chlorosis is especially prevalent in the valleys of South Devon.

(2) The probable cause is that the high degree of humidity checks heat radiation, excretion and metabolic activity.

Facts in evidence that this is the true cause are:—

(a) Disease is most marked in those whose occupation renders the condition of their organs, tissues, and circulation most torpid.

(b) Any circumstance which promotes the functional working of the organs and circulation tends to do away with the disease, *e.g.*, exercise, pregnancy, and saline purgatives.

(c) Cases of anæmia subsequent to certain diseases, in the treatment of which it is desirable to reduce tissue-change and vital activity, do particularly well in the South Devon climate. Renal disease especially is rare amongst the natives of the district.

Before concluding I should like to call the attention of Members to the relationship of locality, which certainly exists in South Devon between chlorosis and the hæmorrhages. For instance, women with a tendency to menorrhagia suffer severely in the South Devon climate, though at the same time the everyday chlorotic very likely does not menstruate at all, and if she does the loss is but scanty. To make one remark apart from the subject of to-night's discussion, I do not agree with Dr. Sunderland's suggestion in his interesting paper in our *Journal* of January, 1898, that menorrhagia of low altitudes is due to direct atmospheric pressure. A very slight change of altitude is beneficial, and a change from a damp to a dry district with no change of altitude at all will often give relief.

In conclusion, I may be allowed to point out that a most useful object of this Society can be fulfilled if members will point out the prevalency or rarity of various diseases amidst the special geographical and meteorological conditions where the member resides. It is as useful to know what conditions are unfavourable for any ailment as is the opposite. It is for this reason I have ventured to describe the frequency of the chlorotic condition in the beautiful, luxuriant, and sheltered valleys of one of our warmest counties.

Dr. SANSOM said he came more as a hearer and a learner than as a contributor to the discussion, but he had spent a very happy and pleasant time, which would prove most useful to him in the days to come, because he had had the pleasure of listening to Professor Clifford Allbutt, and also to his old friend Dr. Leon. Dr. Allbutt had always the happy knack of combining moral truth with striking phrases—to paraphrase James Russell Lowell. At any rate he put things in a way which convinced most men. Between the remarks of those two speakers he could see the great advantage there was in a Society like that, because it was evident the Society meant to get at exactly the right pathology and the best knowledge of morbid conditions, as well as of climatic and other agencies, apart from the physic bottle. The only remarks he could offer which would be of use in the present discussion were in connection with the *heart* in anæmia, leading up to the treatment of the heart in that disease. Dr. Allbutt had taught them how not to take things for granted, and he, Dr. Sansom, wished to emphasise the same doctrine. He would take chlorosis as his type of anæmia. On looking at the books which had been published, even within recent years, he found, first of all, a most able and valuable series of precise observations by Dr. William Russell, of Edinburgh. The conclusion, broadly stated, was that the heart of chlorotics was dilated. He, Dr. Sansom, had had plenty of opportunities of confirming those views. In some cases there was palpitation, and visible pulsation high up in the position of the conus of the right ventricle. He would say nothing of the left ventricle, because he did not know. Then he took up the books of French observers, Duroziez and others, and saw quite the opposite doctrine stated, namely,

that the heart of chlorotics was a small heart. Those were very positive statements on both sides. Could they be reconciled? He thought they could, because he had seen some cases of chlorosis where the heart seemed to be dilated, and others in which it was apparently smaller than the normal. The strange point was that the auscultatory signs, even in some cases a systolic murmur over the apex of the heart, were the same in both cases. The usual chlorotic, in his experience, was a plump person, not an attenuated one. She was white and bad and weak, but not thin, as a rule, though he admitted there were exceptions. He did not expect those around him to take his statement for granted, but would they kindly use their abundant opportunities of observation and say whether the French people were not right in their statement that the heart of chlorotics was often smaller than normal. His own view was that this was the case in the majority of such patients. Why was that so? what was wrong with the heart? One of the earliest explanations, which came from a source that was beyond discussion—Professor Virchow—was that there was a hypoplasia of the aorta in the cases which he had carefully investigated; that the aorta was narrower than normal. That was very feasible, though he agreed with many observers that it could only be proved in a minority of the cases. Still, considering the undoubted fact of heredity, that it was observed when the anæmic change occurred, when there was considerable demand on the powers, and when the growth was going on in “crescendo,” it was not to be wondered at that there was a certain “cave in.” But he, Dr. Sansom, wished to put forward the statement that he was not sure the aorta was the first thing to go wrong. A partial arrest of its development was very likely, but was it the aorta which was *first* affected? He ventured to bring the point forward at Moscow, and contended that the Pulmonary Artery was the first to go wrong, and that the aorta was second, because he had traced out an extreme diminution in the size of the Pulmonary Artery bringing about in very early life all the signs of very profound anæmia. It was not unreasonable to find in those cases, as they so frequently did, auscultatory signs which were very suggestive of something wrong with the pulmonary artery—a systolic murmur

in the second left intercostal space near the sternum. The deficiency in both the pulmonary artery and in the aorta in course of time become righted, and then that 99 per cent. of the cases of chlorosis got well. If that were the true statement, what a great effect it had on treatment from the point of view of climatology and balneology. If they agreed that the proto-pathic change was in the aorta he did not know where it led them, because they were fairly certain to find it continue to the end of life. But if, as he believed, it was the pulmonary artery which was at fault, surely they had means whereby that could be widened. Of course they knew the value of the salts of iron, but they should also think how the lungs could expand in a properly oxygenated air, and how the lung capacity could be judiciously increased by exercise. Many chlorotics when breathing seemed hardly to inflate their upper lobes at all, but that was altered when they were taken to an open stimulating air and taught how to expand their chests. They ought also to think of the influence of baths in such cases, but he was not going to interfere with those who were qualified to speak of the benefits to be derived at certain places. A warm bath, although it improved a patient and made him feel comfortable, was not a thing to continue always. If they had the bath too hot, or if a hot bath were taken frequently, they bled into their own subcutaneous tissues and weakened their hearts. But if the warm bath were followed by a cooler—not necessarily a cold—one, there occurred a stimulation of the respiratory function, and by-and-by the blood-making qualities were very much improved. He was not meaning that medicinal treatment should not go hand in hand with that; of course it should, and iron should be exhibited, but not in large liquid bulk. He thought that all pointed to the extreme value of health resorts, and to the importance of making chlorotic patients breathe the best oxygenated air in a way to make them systematic and symmetric.

Dr. WILLIAM HUNTER said he had some diffidence in accepting the invitation to be present at the discussion, because the question of climatology in anæmia was not the one nearest to his thoughts. He felt especially indebted to Dr. Clifford Allbutt for the remarkably interesting paper with which he

opened the discussion, for in it he brought out the salient points in connection with the variability of the blood. Dr. Allbutt had, so to speak, presented one side of the shield in emphasising the fact of the variability in the composition and constitution of the blood; and he, Dr. Hunter, would present the other side by alluding to another feature, perhaps even more important, namely, its *stability*. One fact which impressed him greatly at the outset of his studies was that there was a remarkable stability of the blood, not only of its corpuscles but of its plasma, under the most diverse and unfavourable influences; so that anæmia could be divided into two great classes. The first was that associated with all sorts of wasting diseases, and in that form the anæmia was very slight. The composition of the blood was very stable in relation to all the factors connected with nutrition; starvation or deprivation of food caused little change in it, though it diminished its bulk, as it did that of ordinary muscle. The other class of factors affecting the blood was that which Dr. Allbutt had very properly drawn special attention to, changes far in excess of those caused by nutritional variations, *i.e.*, changes in the proportion of corpuscles, in the proportion of hæmoglobin, and in the fluid. That anæmia was exemplified by the disease known as chlorosis, but still more so in the toxic anæmias or hæmolytic anæmias, the agencies of which were of a totally different character. Therefore, while he wished to bring out the fact that the blood was remarkably stable under nutritional variations, he also wished to emphasise the point that the blood was most remarkably *sensitive* to toxic agencies; and the changes in it produced in this way were very deep seated and of profound degree, as shown by the establishment of immunity afterwards.

Dr. Allbutt had brought especially forward the subject of chlorosis in regard to treatment, and he had emphasised, very rightly, the researches of Lorrain Smith and of Haldane regarding the increase of the volume of the blood in this condition. The impression produced was, perhaps, one which went beyond the actual limits of what one should draw from those researches. The opener of the debate stated that chlorosis was a question of dilution of the blood. That dilution,

if it were a mere quantitative dilution, ought to affect both corpuscles and hæmoglobin in some proportionate degree. As a fact, however, the corpuscles in chlorosis were relatively very little diminished. In his experience, the average percentage of corpuscles in chlorosis was 75 to 80, which was but little below that of most healthy subjects. But the hæmoglobin was reduced to 20 to 30 per cent. on the average. Dilution of blood might be one factor, but without doubt an essential change in chlorosis was the old one, a diminution of the hæmoglobin in connection with individual corpuscles.

It had also been clearly brought out that certain localities had had large numbers of chlorotic patients. Dr. Leon had shown that in his remarks. He, Dr. Hunter, knew of no place where the disease was so rife as around Cambridge and in the Fen country, and yet it was a fairly healthy country. He did not think it was a mere question of climatology, nor simply one of open air and exercise. He might say, in passing, that he thought the chlorotic was the easiest cured of the anæmias, and there was no need to look around for special localities to which to send such patients. There was one kind of chlorotic in whom the change was one of intense diminution of hæmoglobin, the so-called typical chlorotic anæmia. There was another, more persistent, chlorotic where the change was not so much the qualitative one, but one of oligæmia, a diminution in the quantity of blood. In that form the resistance to treatment was much greater than in the ordinary flabby, fatty, chlorotic anæmia.

If he had had his own choice he would have drawn attention to the other class of anæmias, which were, to him, especially interesting, namely, those in connection with *toxic*, and as his latest observations showed, more especially *septic* conditions. To them he had devoted fifteen years' work, and the problem presented by them certainly involved a question of hygiene, and as such seemed to be within our grasp. The point was to practically exclude all agencies of a septic character from anæmic cases; and he might tell the Society that the remarkable benefit following the exclusion of all, even slight, septic agencies from any part of the body, especially the mouth, had been the most interesting and gratifying result as regarded

treatment he had seen during those fifteen years' work. He would point out that the influence which was present in those cases of anæmia was not merely toxic influence, but really a latent prolonged sepsis especially in connection with the gastrointestinal system, chiefly the mouth. Therefore his conclusion would be in every case of anæmia to recommend the exclusion of every source of septic influence irrespective of patients' objections, and the proper use of intestinal antiseptics.

Dr. COLLIER (Oxford) said he was not aware that the discussion was to be limited to the climatic treatment of anæmia; he thought they would have an opportunity of showing how anæmia was dealt with where there were no baths, but as that was evidently not so he would not continue.

The PRESIDENT assured Dr. Collier that it was not proposed to so narrow down the discussion.

Dr. COLLIER, resuming, said he would like to raise one or two points in regard to treatment of anæmia, though he felt somewhat embarrassed in doing so before such a gathering. He had not seen the question of the gastralgia of anæmia clearly brought out. At the Radcliffe Infirmary, Oxford, many of their house-physicians came down from London hospitals, and for the gastralgic pain they generally prescribed bismuth. It was an old and well known remedy, but he thought it was often given in the wrong way. How should bismuth be given, and how did it act? Patients came to the out-patient department with gastralgia; the house physician gave bismuth, but the pain was not relieved. He often found it had been given about an hour after food. If it were given half an hour before food the pain was almost invariably relieved. Did the bismuth act locally? In his own practice he always gave the bismuth in a thick mucilaginous preparation before food, and he had always believed that it acted locally on the inflamed mucous membrane of the stomach, much in the same way that ointment acted on an eczema. On the other hand, only a few days ago he asked an Examiner in Pharmacology how he thought bismuth acted, and he replied, "By preventing flatulency and gastric disturbance."

He wished to call attention to the question of some of the complications of anæmia, because the anxiety of physicians on

the point had increased of late. For instance, hæmatemesis, which so frequently accompanied gastric ulcer. Occasionally they could see in the journals records of cases of operation for severe hæmatemesis, but it would be a long time before he recommended any such course. He was rather amused by the question put to him some months ago by the President, in a letter, as to whether he found proportionately as much anæmia in Oxford as he saw when practising at Hastings. Of course, if they wished to study anæmia they could not go to a better place than to the Thames Valley, for there the proportion of anæmia was excessively large. Regarding hæmatemesis, he found that during the seventeen years he had been physician at the Radcliffe Infirmary, Oxford, they had dealt with 250 cases of the hæmatemesis of idiopathic anæmia, of whom not one died. In private practice he had seen one or two very severe cases, but they also had recovered. Generally he treated these cases without drugs, except perhaps a little opium; relying on very careful dieting, and a few days feeding by the rectum. With regard to perforating gastric ulcer, that had added a great deal of anxiety to the physician, because they could not always be sure the condition was gastric ulcer; and to call in a surgeon to operate in a private case, especially if the people had not much means, was a very serious matter. He referred to two cases he had seen in the last eighteen months of diaphragmatic pleurisy, which closely simulated perforating gastric ulcers.

One other point he wished to mention was the condition of phlebitis and thrombosis of the veins in anæmia. He had seen two cases of thrombosis of the longitudinal sinus followed by death. He remembered also a case of thrombosis of nearly all the important veins of the body, and both upper and lower limbs. The patient recovered. He wished to ask whether there was any drug which was at all likely to prevent clotting in cases of anæmia where there were commencing signs of thrombosis, because they had at present in the Radcliffe Infirmary an anæmic girl who had developed thrombosis in the veins of both legs and in those of one arm.

Dr. SNOW said they had all listened with very great interest to the luminous address delivered by Dr. Allbutt, and to

the thoughtful sentences uttered by Dr. Sansom, and when they got the full report in the Journal there would be much for them to study and reflect upon in regard to anæmia. But he did not see anything in the notice of the meeting which would lead to the idea that the discussion would not be inclusive of the clinical, climatic, bath, and casual aspects of the subject. He thought the Society should look into the causation of anæmia, and enquire whether it was more common at the sea-side or in inland towns. His own view was that anæmia was largely a question of environment. Where people were sheltered from the prevailing winds, there anæmia would be found to be common. Conversely, on the exposed coast, and especially on an island with which he was acquainted, anæmia was very rare. Putting aside pernicious anæmia and the anæmia of Bright's disease, practically the whole of the anæmia they met with was in the servant girl class. Among the better-placed girls, 'since hockey and cycling and other forms of exercise had come into vogue anæmia was comparatively rare. Exercise out of doors and personal habits were very intimately connected with the disappearance of anæmia. He believed the vast majority of the subjects of anæmia could be cured in any climate.

As to the drug treatment, if he were asked to name any one single drug, he would say give aloes; and in regard to further treatment, iron, especially in particular forms, for some preparations of it did more good than others. Nothing had yet been mentioned about treatment by red marrow, which was exceedingly valuable in some cases of inveterate anæmia, and especially in pernicious anæmia.

What could they do with regard to the various Spas of Europe? It was within the knowledge of all that there were certain cases of anæmia which were not tolerant of the ordinary treatment, and in which they did not get good results. Some of them were due to the neglect of ordinary precautions in giving iron and medicines. In Germany diet was much more strict, &c., and he had often found patients who originally could not take iron had been able to do so when tea and red wines were interdicted. But there was a climate not only above earth but below; there were not only bracing places,

but there were beneficial waters for the treatment of anæmia. He would only briefly speak of the treatment with which he was familiar, namely, at Schwalbach. In the waters were 5 grs. of iron to the gallon, and anyone had only to walk about when the patients were taking their water to be convinced of the extreme potency of the treatment. The ladies would be found with as fine complexions as on Dartmoor. Only a few ounces of the water were given at first, and the quantity was gradually increased to 25 ounces in twenty-four hours. There was the advantage also that no aperients were required. The German physicians had a great belief in these baths for the conditions of heart to which Dr. Sansom had alluded. He thought it was not that a certain amount of iron had got from the bath into the blood, but that the bath stimulated the respiration and the heart muscle, and imparted tone to the heart generally. The waters were not of use when imported; the carbonic acid was insufficient to retain the iron in solution, and it fell as an innocuous oxide at the side of the bottle. The Japanese suffered very much from anæmia, and they had some valuable waters which could be imported into England without losing their efficacy; he referred to the T-ans-an waters.

Allusion had been made to the anxiety with which the physician treated anæmic patients on account of their getting ulceration of the stomach. His experience was that such cases occurred mostly in the shopkeeper and servant-girl class. He was never without such cases in hospital, but did not recollect one which had been fatal. The plan of treatment pursued was very much that mentioned by Dr. Collier, and the patients were kept a fortnight without food by the stomach.

Dr. EWART said it was too late to attempt to do justice to the remarks of Professor Clifford Allbutt, especially with regard to the proportion between plasma and cells; and as the primary object of the meeting was to discuss the climatic treatment of chlorosis, reference to other forms of anæmia could be only incidental. Some of them had been described as toxic or hæmolytic. The question was whether chlorotic anæmia was not likewise toxic, at least in a minor degree. Such a possibility was put forward by Sir Andrew Clark and others long ago, and it seemed substantially true as tested by the

results of treatment. The difficulty in the discussion of this subject arose from their dealing with different quantities, under the loosely applied term of chlorosis. In contrast with cases typically chlorotic, without loss of weight or even with slight increase of weight, they often had before them in hospital ill-fed, emaciated and exhausted young women, of a totally different type. Yet the two kinds were often grouped together, and the same treatment seemed to influence both for good. He was much interested in the distinction drawn by Dr. William Hunter. In the oligæmic patient there was invariably an associated factor which it was within their power to correct, namely, that the woman had bad teeth, and probably not a few infective stumps. He had long taught the distinction he had mentioned, and was glad to see that the subject was much more fully recognised. Many cases of anæmia were perpetuated by the failure of the medical attendant to open the patient's mouth. When these infective foci were removed the matter became one of simple chlorotic anæmia. This had an obvious bearing on the climatic question; if they sent such an exhausted chlorotic away with her misery she could not get well. Her mouth should be set right and her liver put in order first. Thus in the matter of treatment climate was not supreme.

He agreed with nearly all that had been said by Dr. Snow. Of course to the starved anæmic they must also supply food in abundance. A very interesting class of anæmias were the febrile ones. Many of these patients were suffering from dental troubles in an aggravated form, and when that was remedied the fever in many cases disappeared. His main contention was that when they had removed the source of infection and irritation and secured a proper action of the bowels, the patients would get well in proportion as they were given iron and exercise and plenty of sunlight. But without those preliminaries, climate, altitude, and sea air were useless. That was shown by the amount of anæmia to be met with at the sea-side and on the tops of mountains, where patients were sent for the purpose of making blood. It was well known that the women in the Swiss altitudes were wretchedly pale in the winter months. Patients who had lived at high altitudes sometimes had to be sent to England to get back their health and

colour; the secret was that their general metabolism—their liver—was wrong. Again, the poor servant-girl suffered from constipation to a degree which was incredible; she had no time for anything; she was driven about and underfed, everything was done hurriedly, and personal hygiene was neglected. When anæmia occurred in the upper class, advice was sought earlier, and the disease was not allowed to go to such extremes.

The remarks of Professor Clifford Allbutt as to the urinary secretion, came as a shock to him as opposed to what he thought he had discovered. The cause of this discrepancy was perhaps connected with the liver. He had noticed that in spite of the amount of animal food he consumed, and in spite of the exercise he took, which elsewhere led to acidity and high colour of urine, and even sediment, the secretion was remarkably clear and fairly abundant. He had concluded that the altitude, the sun, the dry air, and the general exhilaration acted as conservative agents on the blood, causing a lessened destruction of the red cells or their increased regeneration. When red cells were destroyed they found pigment appearing in the urine, and therefore he had been led to think that the journey to the heights preserved one's red cells. All that, however, had fallen to the ground, and he was in doubt as to what to think of altitudes.

A discussion occurred as to whether the debate should stand adjourned at this point, or whether more speakers should be asked to join before adjourning. Professor Clifford Allbutt said he had very little to say, but he would not be able to attend at the resumption of the debate. It was agreed that Professor Allbutt be asked to reply now, and that then the meeting stand adjourned.

Professor CLIFFORD ALLBUTT, in reply, said he would be very grateful if Dr. William Hunter and others would look up their case-books in regard to the number of corpuscles in chlorosis, because his own experience had been so very different. A small percentage increase of plasma would not cause any great diminution in the number of corpuscles. He should have said that the apparent number was in his experience very considerably reduced. He knew that was not the statement in text-books. All he could say was that in Cam-

bridge and the West Riding chlorosis was attended with great diminution in blood corpuscles—to his surprise; as low as three or even two and a half millions. He would say that an increased reduction was the first thing that came about; and that the changes in the hæmoglobin were secondary. He would rather leave on one side for the moment the hæmoglobin, because he did not think it was primary or cardinal, and to include it would greatly lengthen the discussion. He thought he must differ from a great deal that had been said, which seemed ungracious after the great kindness shown him. He did not know that hygienic conditions would create chlorosis; he thought they did not. He believed that whether chlorosis seemed more prevalent among servant-maids or in higher classes, depended upon whether one had out-patient practice at hospitals. He could say it was exceedingly prevalent in the upper classes of society, and that it was a family disease. Any disease was made worse by bad hygiene, but that bad hygiene caused chlorosis he doubted. One form of anæmia might be called starvation anæmia. He did not think that was chlorosis, nor was it that which Dr. Sansom mentioned; it was anæmia. Chlorosis was a disease which virtually occurred only in women; he did not remember diagnosing a case of chlorosis in a man once in ten years. The starvation anæmia was found in both sexes, but it was not chlorosis.

He concluded by inviting speakers to look through their case-books and see what were the numbers of corpuscles which they found. He had to thank all present for the cordial, undeserved, and great kindness with which they had received the very fragmentary, bald, and imperfect remarks he had been able to make.

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BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL  
SOCIETY.

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ORDINARY MEETING, FRIDAY, MARCH 15, 1901.

RESUMED DISCUSSION ON "ANÆMIA AND ITS THERAPEUTICS."

Dr. F. BAGSHAWE, J.P., in the Chair.

The PRESIDENT said, before the business of the meeting commenced, he would read the reply from the Home Secretary to the Address of Condolence which was approved at the last meeting.

HOME OFFICE, WHITEHALL,

*March 13, 1901.*

SIR,—I am commanded by the King to convey to you hereby His Majesty's thanks for the loyal and dutiful resolution of the Fellows of the British Balneological and Climatological Society on the occasion of the lamented death of Her late Majesty Queen Victoria.

I am, sir,

Your obedient servant,

CHARLES RITCHIE.

F. BAGSHAWE, Esq., M.D., J.P.,

35, Warrior Square, St. Leonards-on-Sea.

Dr. ANDREW MYRTLE (Harrogate) writes: I regret I cannot possibly attend the meeting on 15th, had I been able to do so, I should have spoken on one or two points which to my mind have given rise to the great increase of anæmia and chlorosis during the last twenty years.

(1) I think over-education, long hours in stuffy rooms, which are also overcrowded with very partially washed children, is a possible cause; (2) the enormous amount of cheap sensational novels which are devoured by servant girls and shop girls after working hours, when they should be in bed and asleep; that to me appears more hurtful than

bad air and insufficient food ; another factor (3) is insufficient *warm* clothing, especially underclothing. The young girls of to-day think more of gay colours than substantial woollen garments, and after getting heated are readily chilled. Sir J. G. Simpson pointed out in the early fifties that he found anæmia and chlorosis much more common among the cotton mill hands in Lancashire than among those working in the woollen mills of Yorkshire, and assigned it to the fact that the atmosphere in cotton mills contained a considerable amount of fluff, whilst that in the worsted contained a certain amount of oily particles ; and came, I think, to the just conclusion that this difference contributed to the unhealthiness of the one and the vigorous healthy condition of the other. In my early days, whilst practising in Scotland, almost all children up to 15 or 16 had oatmeal porridge and milk for breakfast and supper and I cannot recall any cases of anæmia. I believe the substitution of bread and tea, both morning and evening, has had a great deal to do with diminution of the red corpuscles in the blood. You may have heard of Dr. Johnson's definition of oatmeal, he said, "It was used as food for man in Scotland and horses in England," and the party to whom he made the remark said, "Yes, and where will you find such men and such horses?" At the time I have no doubt there was force and truth in that observation. You know I am against the present fashion of over-dieting, such as the white meat, white fish with no potatoes, no sugar and no alcoholics ; but in oatmeal I believe we have the grandest food for the physical age and the mental development of the young. I hope you will pardon my encroaching on your time and trust you will have a most successful gathering.

Dr. WADDELL (Potters Bar) said he believed Dr. Clifford Allbutt, in his address, attempted to limit the discussion entirely to non-toxic anæmias, and especially to non-medicinal treatment, *i.e.*, to balneological treatment. He (Dr. Waddell) would like to restrict what he had to say to that. It was interesting to find Greek meeting Greek on that floor, in the persons of Dr. Clifford Allbutt and Dr. William Hunter, and to hear one making certain statements and the other contro-

verting him. But that was easily explained by Dr. Allbutt's admission that at present surprisingly little was known about the subject. The result of the limitation of the discussion was that the only subject before them was chlorosis. Dr. William Hunter alluded to the wasting or starvation anæmia as being also a form of chlorosis, but he (Dr. Waddell) felt that even this must fall out of the range of discussion that evening, as he believed it to be essentially of the nature of a toxic anæmia. If they wished to seek for the primary cause of that anæmia he thought they must go back in the history of the individual to the time when the first bud occurred in the mother's ovary, for he believed it was due to some initial taint in the parents. That left the field free for the discussion of the question of chlorosis, especially from a climatological standpoint. Dr. Allbutt took one's breath away by saying that all present methods of considering chlorosis were crumbling to pieces, and that blood counts were of little value. That gentleman had intimated that, according to the researches of Lorrain Smith and Haldane, under nutritive influences the blood was liable to considerable variation, but that when it came down to the condition of chlorosis it was practically uniform, and he went on to lay down the theory that full-blooded chlorosis was due to a relative increase in the plasma, which amounted to hydræmia. Dr. William Hunter attacked that point and said that under ordinary nutritive influences the blood was absolutely uniform, and it was only when it received the evil influence of some imported toxine that it began to vary, and that therefore ordinary chlorosis must be included in the list of the toxic anæmias. One might well ask which of those two men was right. He thought they were both right in some respects, but that Dr. Allbutt was more right than Dr. William Hunter. His reason was simple. In looking for the primary cause they must go back to the mother's ovary. Chlorosis was a disease affecting fertile families, especially those families whose members showed considerable muscular development. It also affected whole areas of land where the people inter-married. He thought the nature of the influence, starting from the mother's ovary, was a lack of developmental

force, that the child was launched into the world with a tendency to fail to carry out certain functions up to the usual standard. He was inclined to agree with the older theories mentioned by Dr. Pagan Lowe, that chlorosis had much to do with the blossoming out of a woman which occurred at puberty, that period when she was ready to receive that particular impulse which enabled her buds to reproduce the species, and so at that period her body began to fill up enormously. When those increased demands came there was less hæmoglobin relatively, which made her unable to produce the required number of red blood corpuscles to keep up her nutritive balance. When they considered what they could deduce from that in the way of treatment, the theory became very suggestive. They were told by Dr. Hunter, Dr. Collier and Dr. Leon, and Dr. Allbutt supported the statement, that there were certain areas in the country where chlorosis was particularly prevalent. All those areas were found to possess certain conditions in common—*i.e.*, a chilliness of the atmosphere. The districts referred to were the Yorkshire Wolds, the expansive tracts around Cambridge, the valley of the Thames, and the damp, low-lying valleys of the Devonshire coast. On the other hand, they were told that when chlorotics were sent to high altitudes, or where there was a dry air at low altitudes, as at Helouan, in Egypt, they rapidly improved; but on their return from those districts the cases were liable to relapse into their original condition. Dr. Allbutt pointed out that the blood condition in the skin was not an index of the same in the depths of the body, and that was an important matter, creating an analogy between chlorosis and malicious malaria. In the latter there was a large concentration of blood elements accompanied by parasites in the blood in the central tissues and marrows. The problem must be worked out upon the chlorotic cadavera; for it was important to know the altered proportions of blood in the deeper as compared with the superficial parts of the body. His conclusion was that whatever chilled the skin, such as a cold bath or a damp atmosphere, drove the blood to the interior, and was injurious

to chlorotics. Whatever relieved that tension, such as an uniform atmosphere, assisted chlorotics to recovery. That, he thought, explained the extraordinary improvement experienced at Davos and Helouan in a few days, and its disappearance when the patients returned. The chlorotic must not be submitted to depressing influences, either in the shape of large quantities of cold liquids internally, or cold applications to the skin, but must be put into a condition as nearly as possible like that obtaining at Helouan.

Dr. PAGAN LOWE (Bath) said : Mr. President and Gentlemen, it is very difficult in the space of ten minutes to make any useful addition to a discussion on a subject like anæmia and its therapeutics. It would have been better, I think, had the discussion been limited to primary anæmias, on which our views have undergone such a marked change during the last few years, thanks to the researches principally of Addison, Quincke and Hunter. What was considered to be the same disease of varying intensity is now known to be two very distinct pathological entities—chlorosis on the one hand and idiopathic anæmia on the other, and the more these diseases are studied, the more clearly can they be differentiated from each other. Iron anæmia and arsenic anæmia are as distinct from each other as the drugs which we employ in their respective treatments.

Chlorosis, practically, is observed only in women, while pernicious anæmia, although common to both sexes, is seen more frequently in the male. Chlorosis, again, seems to be due to deficient hæmogenesis, idiopathic anæmia to excessive hæmolysis. The microscopic appearance of the blood in pernicious anæmia is characteristic, and serves to separate it from all other anæmias. There is only a slight diminution in the number of red cells with poorness of hæmogoblin in chlorosis, whilst a great diminution of red cells with relative richness of hæmoglobin in pernicious anæmia. Normoblasts (nucleated red corpuscles) are present practically in every form of anæmia where an effort is being made by the blood-producing organs to regenerate it, but in simple anæmia the cells are not distorted like they are in pernicious anæmia,

where they assume the large giant forms and the curious elongated and rod-like bodies so characteristic of the major disease. The diagnosis, therefore, between these two diseases ought not to present much difficulty. The cause of chlorosis is certainly obscure. Osler thinks that it is connected in some way with the evolution of the sexual apparatus in women ; so does Virchow. But the late Sir Andrew Clark was inclined to ascribe it almost entirely to ptomaine poisoning, the result of constipation, and a tight corset. Certain it is, that cases are common under the most favourable conditions of life, and therefore the disease cannot be ascribed to ill feeding and over work.

The diagnosis of chlorosis is of course simple : the peculiar complexion, the well-nourished condition of the patient, and the bluish or white sclerotics, are very characteristic. There is one point, however, worth noticing, and that is the danger which exists in mistaking the apparent anæmia in the early stage of pulmonary tuberculosis for chlorosis. The mistake, however, can be avoided by placing a drop of blood on a piece of white blotting paper, when the deficiency in hæmoglobin is easily observed.

As regards pernicious anæmia, most interesting are the researches of Quincke and Peters, who showed that there was an enormous increase in the iron in the liver, which suggested that the affection was probably due to increased hæmolysis. Hunter's observation, too, of the urine, showing that it is darker in colour and contains pathological urobilin, also supports this view.

Clinically, anæmia with evening pyrexia, in the absence of organic disease, ought to excite suspicion, and yet I have seen cases in consultation which have been entirely overlooked, and the condition ascribed to advanced heart mischief. It seems hardly credible, but I know of a case which was treated for three months for typhoid fever, because in addition to the evening rise of temperature there was a certain amount of diarrhœa.

The secondary anæmia of septicæmia, in those not uncommon cases of suppurating teeth mentioned by a speaker

at our last meeting, may present some clinical resemblance to idiopathic anæmia, but ought not, really, to offer any very serious obstacle to diagnosis. The treatment of the two forms of primary anæmia scarcely lends itself to discussion. Who would venture to withhold iron from chlorosis or arsenic from pernicious anæmia? Formerly it was a common practice to combine these drugs in the treatment of chlorosis, but in the light of recent experience such a combination is quite unnecessary and would seem to beg the question. In chlorosis, then, the administration of one of the iron salts in the powder form in preference to pills, with a suitable aperient if necessary, and a liberal diet, leaves nothing to be desired. In my experience the common practice of taking a morning hot bath has seemed to retard recovery, whereas Charcôt's douche has had the opposite effect.

In the treatment of the pernicious variety, too much stress cannot be laid on the importance of putting the patient to bed as soon as the disease is discovered, and administering arsenic in increasing doses. I have never seen any benefit follow on change of air. Indeed, the time lost thereby may have serious consequences for the patient by postponing the arsenical treatment. Intestinal antiseptics in my hands have done nothing, and in this respect my experience does not coincide with Dr. Herbert Snow's, of Bournemouth, who advocated their employment at our last meeting. The chlorotic, however, undoubtedly benefits by change to a bracing climate, although iron usually renders such change unnecessary. In the secondary anæmia of hæmorrhage the case is different and change always seems to do good.

A word, in conclusion, on bathing and massage in the treatment of anæmia, the pernicious variety excepted. Massage certainly does good and has been strongly recommended by Dr. J. K. Mitchell.

Tepid and sponge baths night and morning, or better still, Charcôt baths, have given me much assistance, and when the disease is accompanied by cardiac dilatation, the Nauheim bath has proved beneficial. But even in heart dilatation Charcôt's douche seems to effect as much as the Nauheim treatment.

Dr. HAIG said: It is about nine years since I first suggested that there was a relation between the condition of the blood and the quantity of uric acid passing in the urine.

In the *British Medical Journal* in 1893 and 1894, I showed that the quality of the blood varied from month to month, from week to week, from day to day, even from hour to hour, with the quantity of uric acid passing into the urine.

In 1894 I also pointed out that by swallowing uric acid in one form or another the condition of the blood could be made to alter from day to day in any one.

This relation between various forms of anæmia and a large excretion of uric acid in the urine has been noticed by others; but they have generally considered that the excess of uric acid was a result, not a cause, of the blood condition.

With regard to this I have pointed out that the excessive excretion of uric acid is a result of causes which acted long before there was any anæmia, and that by controlling the uric acid or administering it the blood changes can be controlled.

We have it, then, as our first fact, that under all conditions an excess of uric acid in the blood means a fall in the value of the blood decimal, and that by controlling uric acid the blood condition can be controlled.

From this I have drawn what seems to me the only possible conclusion, that uric acid is a cause of anæmia, and further considerations make me believe that it is *the cause* of anæmia, perhaps the only cause.

Among these considerations are the relation of chlorosis to rheumatism in girls, as when a girl at 13 gets rheumatism and later on at 17 gets chlorosis; and then perhaps for some years she may have an alternation of rheumatism, chlorosis, rheumatism, chlorosis.

Now this is perfectly simple, for the very uric acid, which, when it is in the joints causes arthritis, when it is in the blood between the attacks of arthritis causes chlorosis.

And we have now learned to tell when it is in the blood and when it is in the joints, by its effect on the capillary circulation. Thus in arthritis the capillary reflux is quick,

showing absence of uric acid from the blood, and in chlorosis it is slow, showing its presence.

Again, the relation of anæmia to Bright's disease, chronic gastro-intestinal derangement and old age, is simply its relation to a more or less constant excess of uric acid in the blood, which is met with in these conditions, because they make the blood a good solvent of uric acid.

I believe that many cases of so-called pernicious anæmia are simply anæmia in relation to chronic or incurable gastro-intestinal derangement, which keeps the blood in a condition to dissolve all the uric acid available.

We see the same in chlorosis, where gastro-intestinal trouble is present and difficult to cure; the chlorosis is also for a time incurable.

In the same way paroxysmal hæmoglobinuria and Raynaud's disease are related to an excess of uric acid in the urine and blood; the obstruction which the uric acid produces in the circulation is the cause of the gangrene, and the uric acid with the altered circulation produces the hæmoglobinæmia and hæmoglobinuria and the resulting anæmia.

The relation of anæmia to fevers, and especially to malarial fevers, is again simply its relation to a more or less enormous excess of uric acid in the blood, and so-called blackwater fever is a paroxysmal hæmoglobinuria from a temporary exaggeration of these conditions, and this enables us to explain the action of quinine in precipitating blackwater fever.

During the fever there is a storage of uric acid in the liver, spleen, and other organs, and at the end of the fever a great part of this comes through the blood, and produces the blood changes and the signs in the urine; and quinine increases both the uric acid in the blood, and its action on the cells.

Lastly, there is the undoubted fact, of which I could bring forward scores of instances, that giving up all uric acid-containing foods makes the blood decimal improve at least 25 per cent. above the point at which it stood on a diet containing flesh and tea.

In other words, all those who take flesh and tea, which introduces uric acid into the body, are more or less anæmic.

And so constant is the above result that I take the condition of the blood as the index of the amount of uric acid that passes through it either from week to week or month to month, and have been led to produce a card<sup>1</sup> for the approximate estimation of the blood decimal which I habitually use as the indicator of the amount of benefit that a patient is deriving from a uric acid free diet. It can be used also to estimate the effects of drugs.

The capillary dynamometer for estimating the capillary circulation tells you the amount of uric acid passing through the blood from hour to hour, the blood decimal card tells you the same from week to week.

I may sum up my points as follows :—

(1) There is a constant relation between the condition of the blood and the amount of uric acid passing through the blood and urine ; and the uric acid is the cause of the blood changes which can be produced by administering it, or controlled by controlling or withholding it.

(2) This reading of the facts gives us a complete explanation of the relation of chlorosis to rheumatism, and of anæmia to Bright's disease, chronic gastro-intestinal derangement, and old age ; of paroxysmal hæmoglobinuria to Raynaud's disease, and of anæmia to fevers, especially to malarial fevers, and to blackwater fever.

(3) All drugs that cure anæmia clear the blood and urine of uric acid ; but if they fail to clear it out of these fluids they fail to cure the blood condition ; hence iron fails under some conditions, as those of dyspepsia, and succeeds under others.

(4) Many other drugs, as mercury, copper, chloride of ammonium, sulphate of magnesia, will cure anæmia, if they clear the blood of uric acid ; and the blood of everyone improves when uric acid is excluded from their diet as far as possible, while the blood of children brought up on a uric acid free diet is and remains above our present standards.

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<sup>1</sup> To be obtained from Messrs. Bale and Danielsson, 85, Great Titchfield Street, Oxford Street, W.

Dr. KINGSCOTE : As the relation between cardiac dilatation and anæmia was alluded to by Professor Clifford Allbutt, and enlarged upon by Dr. Sansom at our last meeting, I feel justified in making a few remarks on this head, bearing as they do on the treatment.

By general consent chlorosis was taken as the type for discussion, the term anæmia being considered too comprehensive a one to admit of manageable consideration.

As to the relation between cardiac dilatation and chlorosis, the opinion of our profession seems to be very much divided on this score.

Our eminent and experienced colleague, Dr. Sansom, at the last meeting of this Society, said that on looking at the books which had been published even within recent years, he found first of all a most able and valuable series of precise observations by Dr. William Russell of Edinburgh. His conclusion broadly stated, was that the heart of chlorotics was dilated. He, Dr. Sansom, had had plenty of opportunity of confirming these views. Then he took up the books of French observers and others and saw quite the opposite doctrine stated, namely, that the heart of chlorotics was a small heart. These were very positive statements on both sides. Could they be reconciled ? He thought they could because he had seen some cases of chlorotics where the heart seemed to be dilated and others in which it was *apparently* diminished. The strange point was that the auscultatory signs, especially over the apex of the heart, were the same in most cases. His own view was that the heart was smaller in the majority of chlorotic cases. How shall we reconcile these very contradictory statements emanating from so high an authority. The obvious inference is, that Dr. Sansom in his wide experience has seen a very large number of cases of chlorosis in some of which the heart was apparently (he was careful to use the word *apparently*) dilated whilst in others it was *apparently* diminished. This caution in statement argues a want of precision in our generally accepted methods of percussing out accurately the boundaries of such a deep-seated organ as the heart, which even in the normal state is

partially over-lapped by lung substance and in full inspiration is completely so over-lapped.

I believe that herein lies the crux of the whole matter. It is my lot to see a very large number of chlorotics and other forms of anæmias. They consult me on account of cardiac dyspnœa, and it is my experience that in every one of these cases there is cardiac dilatation often undiagnosable by ordinary methods of percussion, on account of the frequently concomitant hyper-distension of the lungs (or lungenverschwellung) consequent on the cardiac dyspnœa on exertion which usually accompanies these cases. I have here in my hand a pleximeter, by means of which it is possible and even easy to percuss out the boundaries of a deep-seated organ, even when over-lapped by an air-distended viscus. It was described in the *Lancet* of March 26, and appears in my work on "Asthma." There is no time now to embark on a description of it, but I shall be very pleased to show it to anyone at the conclusion of this meeting.

Here we have, then, an explanation of the apparently enlarged hearts and the diminished, having the same set of physical signs, the fact being that they are all enlarged. I often have cases of weak heart brought to me with a legend that Dr. So-and-So has said that the heart was too small. I do not believe it, as I invariably find these cases to have dilated hearts. I do not believe that we ever have diminished hearts, except in cases of congenital malformations, which are so extremely rare that we can afford to disregard them. A weakened heart always tends to become dilated rather than contracted, because applied energy, when exhausted, always gives way in a direction opposite to that of its application. Now a well contracting heart is a strong heart, either intrinsically so or temporarily from erratic nerve influence, as in sthenic fevers, such as typhus.

Now in the latter the heart beats vigorously, possibly from septic poisoning of the cardio-inhibitory centres—and is not dilated, whereas in æsthenic fevers such as typhoid, the heart beat is mostly feeble, and there is dilatation. When, however, the fever stage in typhus has run its course and the

special cardiac stimulus has disappeared the exhausted heart begins to flag and to dilate, and we get the post-febrile condition of collapse familiar to us, which in some cases is a dangerous one.

Let us consider the behaviour of another automatically-acting muscle in these two fevers, namely, the iris. In sthenic typhus we observe a contracted pupil, in æsthenic typhoid a dilated one. These examples justify us in surmising that the heart in a debilitated condition such as in chlorosis would be a large heart, and not a small one. Is the enlarged heart in chlorosis, cause or effect? I believe it to be both. On the one hand we get the anæmic condition causing dilatation, and on the other the dilated heart providing an insufficient blood supply to each and every organ of the body, and thus inducing a diminution of function accounting in part for the long row of conditions characterising chlorosis, including diminished excretion, retained excreta, autotoxis, and finally a diminished blood supply to the heart wall itself, thus completing the vicious cycle.

#### TREATMENT.

One of the results of the last discussion was that, broadly speaking, hygiene, warm and dry air and plenty of it, freedom from worry, and exercise were the best means to combat the chlorotic condition. I have found that the application of the Schott methods carefully administered and comprising resisted exercises (*viederstandsgymnastik*) and carbonated baths to diminish the cardiac dilatation greatly accelerate the cure.

Hyper-expansion of the lungs by means of breathing exercises through the nose and frequent inhalations of pure oxygen gas are also of great benefit, and greatly facilitate the assimilation of iron which we must regard more as a food than a medicament in these cases. The peptonates of iron and manganese seem to be the best means for ready assimilation. I was introduced to them at Wiesbaden in 1895. The chief objection to them was that they were very nauseous to the taste, this was overcome by my then chemist, Mr. Orchard of Salisbury, who made them up in old port wine in

the form of elixir which can be taken after meals as a liqueur, and is very pleasant to the taste. His elixir of iron and manganese can be obtained from him. In 1896 Mr. Squire introduced these peptonates to London. The advantages of the peptonates are : (1) they do not affect the dental enamel ; (2) they do not upset the stomach as they are unacted on until they reach the alkaline influence of the pancreatic juice ; (3) they are very readily assimilated ; (4) they are non-astringent ; (5) for some reason unknown the combination of iron and manganese is more readily assimilated than iron alone. Each dose of elixir contains about two grains of absolute iron.

Dr. FORTESCUE FOX said he proposed to confine himself to some practical observations from a balneological point of view. He thought those who practised much at mineral spas must be familiar with quite a number of forms of secondary anæmia in patients who frequented those places, and must have been impressed by the large number of them who recovered under mild eliminative treatment. The anæmia, for example, left by acute and other rheumatisms, as well as that of kidney affections, was often greatly benefited by chalybeate waters, as was pointed out 100 years ago by Dr. William Saunders, who showed that chalybeate waters, especially when heated, were absorbed with great rapidity and caused decided improvement, particularly in the anæmia complicating kidney disease. There were also, as was pointed out by a previous speaker, many cases of anæmia in the aged, without any special disease that one could discover—a failure of nutritional activity everywhere, and marked anæmia. Here also, baths and small doses of mineral water very much improved the anæmia of the aged. It was the experience at some of the thermal establishments on the continent that baths alone, carefully administered to the old, tended to improve nutrition, and therefore anæmia. He would like to say a word with reference to the anæmia accompanying dyspepsia, with which they were all familiar. He was glad to hear that Dr. Haig was inclined to attribute many anæmias to a dyspeptic condition. He believed he had seen cases of slight

but very chronic catarrh going on for many months and even years—a limited gastro-intestinal catarrh, with continuous coldness of the surface of the body, accompanied by profound anæmia. He had seen those cases relieved by a combination of baths and mild eliminative treatment. One could see the great practical importance of removing such people from cold, damp localities, where they were constantly subject to chill.

He would also like to refer to the anæmia of young people who were formerly called scrofulous. It was a matter of experience that the anæmia and other symptoms in such cases were relieved by resort to marine climates. Whether the cure was due to the action of chloride of sodium, or of iodine, or to some other stimulus to the digestive system he did not profess to say.

He agreed with Dr. Pagan Lowe that *hot* baths were mostly to be avoided. He had seen anæmia induced by a course of waters containing sulphur. That observation was first made at Weilbach in Germany, where it was ascribed to a "blood-moulting" process. He thought that doctrine was now exploded; but the fact remained that at all the sulphur spas secondary anæmia was apt to be produced by sulphur water.

They had, therefore, in practice to administer in most cases of anæmia which frequented the spas a mild eliminative treatment, which, so far, lent support to the view that such anæmia was toxic in origin. They had also to try to improve the circulation by increasing the ventricular action, and see to it that the blood did not linger in the venous system, by the use of respiratory and breathing exercises, by hill-climbing and by douches. If elimination were attended to on the one hand, and the circulation improved on the other, he was confident that most of the cases of secondary anæmia were susceptible of complete cure at the Health Resorts.

Dr. ST. CLAIR THOMSON: In the few remarks I have to offer I will endeavour to abide by the suggestion made in the scholarly address of the opener of this discussion. Professor Clifford Allbutt "urged that the discussion should be confined to the treatment of anæmias by physical means." The term

anæmia covers a multitude of diagnostic inadequacies, and in a number of cases the appropriate treatment is at once indicated by the detection of the cause. I presume that we need not discuss the anæmia due to defective or deficient nourishment, damp or unhealthy houses, or that accompanying the convalescence from acute disease. Such conditions are too obvious. Nor need we linger over that consequent on loss of blood from a uterine fibroid or gastric ulcer, the anæmia of some forms of Bright's disease, or that associated with the early stages of tuberculosis. I would only refer in passing to the anæmia, sometimes very marked, which I have seen as a result of epistaxis. The nose bleeding has been in these cases looked on as the part of the anæmic condition ; it was often the one and only cause, and the anæmia was at once arrested by destroying a leash of vessels which are apt to be irritated into a condition of varicosity on the cartilaginous septum.

It has been suggested in the course of the debate that our attention might well be concentrated on the idiopathic forms, while another speaker intimated that most of these were really toxic, due in a large majority of cases to septic absorption, and therefore no longer to be classified as "idiopathic."

That many cases are really due to septic absorption I can fully confirm, and would extend the possible sources of infection which Dr. Hunter mentioned. Not only should the mouth and throat be examined for foul gums and carious teeth, but a full inquiry may elicit the necessity of examining the ear, investigating the nose, or scrutinising the throat. An anæmic child or adolescent will still remain anæmic if he is the victim of a chronic otorrhœa, of caries in the middle ear or mastoid cavity, of suppuration in the nose or its accessory cavities, of certain chronic forms of tonsillitis, or of foetid bronchorrhœa. Those who have opened or even explored many empyemata of the maxillary antrum—which is by no means a rare disease—will bear me out when I say that no fouler smell is imaginable, and the wonder only is how tolerant the system becomes of ills that mount up gradually.

And here I would refer to another advantage which is

secured by examining the air passages. The degree of anæmia can often be much more satisfactorily gauged by looking at the hard and soft palate than by looking, as we are accustomed to do, at the gums or conjunctiva. When this anæmia of the palate is associated with any laryngeal catarrh, and if the epiglottis is at the same time anæmic, it at once raises the suspicion of tuberculosis. In the nose an anæmic condition of the mucous membrane may be associated with a passively congested and catarrhal condition of the cavities, or it may cover a collapsed and dry condition of the spongy bones. Many a case of pharyngitis is due to anæmia, especially when gastric symptoms are added, and the unfortunate patient is given a jujube and has his or her throat repeatedly scarred with a galvano-cautery when the only treatment suitable is so-called "general treatment."

Many speakers have insisted on the necessity of fresh air and plenty of it, others have expressed it as the need for filling the lungs with oxygen. But this is impossible if the nose be obstructed. Amongst the overlooked causes of anæmia are various obstructive affections of the nose. They need not be mentioned in detail, and although in adults partial, or even almost complete obstruction, may gradually develop without in many cases seriously interfering with the patient's health, it is very different with the growing person. It has been said that man is the only animal that breathes through his mouth, and he is a fool when he does so. So strong is the instinct for nasal respiration, that a child will learn to subsist on a sub-normal amount of air sooner than inhale more through the mouth. This accounts for the depressed sternum and ribs seen in rickets, for if the child with nasal obstruction would but open its mouth the atmospheric pressure inside and outside the chest would be equal and there would be no more reason for the ribs falling in than for their falling out. Mouth breathing, even when established, fails to fill the chest as fully as when the air is drawn through the nose. This has been demonstrated experimentally, and any one can satisfy himself that the capacity of the chest is not enlarged horizontally to the same extent by buccal as it is by nasal respiration. A

patient with obstructed nasal chambers cannot fill his lungs in the manner advised and hope to get rid of his anæmia, unless we see that he is not only placed in good air, but is physically able to inspire it properly.

The anæmia of adenoids is not a matter of mere empiric observation. The blood has been carefully investigated by Lichtwitz and Sabrazès in patients before and after the removal of adenoids. They found that before the operation there was a slight degree of anæmia and leucocytosis, a relative and absolute increase per cubic millimetre of the large mononuclear leucocytes, of the lymphocytes, and of the eosinophilic cells; with, on the contrary, a relative and absolute diminution of the polynuclear neutrophils. After the operation the formula tended to normal and the weight increased.

Dr. PERCY LEWIS (Folkestone): I have always thought that the term anæmia included a variety of conditions, and each year I have become more and more convinced of the fact. How different for instance are the states of a typical fat chlorotic domestic servant, and the thin anæmic English children born in India. Compare the chlorotic again with tall over-grown, flabby, pale children, so often seen among the children of the rich, such as are so frequently the subjects of spinal curvature. Without the anæmia due to hæmorrhages, purpuric children seem to me to have a special anæmic look of their own, as too have persons of both sexes with rheumatic tendencies. Primary anæmia too is not confined to the young of both sexes, one often sees it in those patients in whom we frequently suspect the presence of malignant disease, but who get quite well on the appropriate treatment. Then there are those anæemics who have a kind of general œdema, who may or may not pit all over. The œdema may be due to that general increase in the bulk of the blood described by Professor Allbutt. It seems to me to be not due to cardiac weakness, because there is never any other sign of backward congestion of the circulation such as one sees in cardiac dropsy.

Without mentioning the anæmias of ague and malignant disease and pernicious anæmia, there is a very common form

of anæmia, viz., that due to menorrhagia in young women. What one may call the primary anæmic, and the chlorotic, suffer from amenorrhœa, but the menorrhagic anæmic is of a different kind. The patient becomes exhausted and anæmic from the profuse loss at each catamenia. From thence the system more or less rapidly recovers without any treatment until the next period gives her another knockdown blow, and so she goes on always getting less and less anæmic until the next large loss again makes her pale. These cases are frequently only due to chronic uterine congestion from cold and inefficient clothing. The majority are cured by efficient clothing, and a course of ergotine.

But there are other classes of anæemics who can at present only be distinguished by the different effects of treatment. As is well known some anæemics are not benefited in the least by iron in any of the protean forms which the ingenuity of the druggists have devised. These, which are often rapidly cured by arsenic, must differ in character from those equally rapidly cured by iron. Some anæemics are cured by any form of iron, others require most patient watching and treatment before the right preparation of iron for them is found. Some anæemics cannot be cured until put at rest in bed for a few weeks, others benefit by moderate exercise. Surely patients requiring such different treatment must differ from each other as much as the menorrhagic, the rheumatic, or the chlorotic anæemics do?

Another point I would draw attention to is the seriousness of anæmia, not so much of itself as from the complications to which it is liable. It has fallen to my lot to see in private practice three fatal cases of perforation from gastric ulcer, within a short time of each other, in patients who were not, previously under medical care. One was a young lady in a school whose parents did not have time to reach her before she died. Death from the movement of clots from thrombosed veins is also common. Neither of these two complications should occur unless the previous anæmia had been neglected. Venous thrombosis from anæmia is frequent in persons over the usual chlorotic age, and is often put down to gout. I have

seen more than one such case treated by alkalies by physicians of note. In each case the thrombosis kept recurring until a course of acids and iron was instituted.

Dr. DOUGLAS KERR (Bath): The few remarks which I can contribute to this discussion on anæmia refer to it in its clinical aspect as one meets the disease in thermal practice. One cannot help being struck, as has been so ably brought out by Professor Clifford Allbutt, by the fact that there are several kinds of anæmia, or rather, that which we call anæmia presents itself to us in different characters and with different physiological and pathological features; thus the blood of patients suffering from anæmia as a result of acute rheumatism, differs considerably from the same condition due to rheumatoid arthritis. In the former there is a degeneration of the red blood corpuscles and a corresponding loss of hæmoglobin, while in the latter the reduction of hæmoglobin is out of all proportion to the reduction of red blood corpuscles; and again as regards elimination of uric acid, as the result of careful analyses of the waters of most patients coming for treatment I find some specimens showing the largest amount of uric acid I have ever met with have been supplied by anæmic girls in their teens, who had no gouty symptoms and whose family history was free from gouty taint. Among gouty patients some of the most highly-charged uric acid specimens of urine have been in cases where the gouty symptoms were quiescent, but in whom anæmia had become a marked feature. Then as regards the treatment of anæmia, I have had some most gratifying results from the whole body hot air baths, where the source of heat is electric, and where light and heat are combined. I have found this treatment answer with patients who resisted or were intolerant of iron in any form. I should strongly recommend its being given a trial in obstinate cases. As regards iron, it is a matter of common experience in Spa practice that a very small amount of iron prepared in the laboratory of nature, in a thermal water, will yield results quite out of proportion to the amount of iron imbibed. In the thermal waters of Bath, analysis shows that only 1·217 grains of iron are present in each imperial gallon, but this iron is in

the form of proto- or sesqui-carbonate, a proportion so unstable that it cannot be kept in the laboratory, being converted by the action of the atmosphere almost immediately into the red oxide. Now this small, one might almost say homœopathic, quantity of iron, produces its pathological effects and yields excellent results when administered in the thermal water. Both the waters of Bath and Buxton have, besides a small quantity of iron and other solid ingredients, a large amount of free nitrogen gas, and it is no doubt to this combination that much of the undoubted benefit in cases of anæmia is due, for there is abundant evidence to prove that nitrogen gas present in thermal waters exerts a powerful influence in exalting and hastening the building up of muscular and other tissues in the body, as well as improving the quality of the blood by an increase of red blood corpuscles and hæmoglobin.

Dr. LARKING (Folkestone) : After the very interesting and instructive address by Dr. Clifford Allbutt, and in spite of his suggestion as to the direction the debate should take, I was much disappointed to find that instead of anæmia being treated from the climatological and balneological point of view, the speakers took up rather the pathology or clinical aspect of the disease, and spoke upon the subject from a "Medical or Pathological Society" standpoint.

In my opinion this was a great mistake : our Society is, I imagine, formed to ascertain the influence of baths and climates, and we do not want our debates to degenerate into an academical discussion on such abstruse topics as the pathology, pathological chemistry, or the clinical aspects of anæmia. We want to open up new ground, and if those members who join the Society because they are especially interested in its particular objects are to have to listen to elaborate disquisitions on this or that particular fad of certain members who are interested in certain special subjects and not in balneology or climatology, I predict a falling off in the attendance at the meetings by the provincial members.

I was specially interested by Dr. Clifford Allbutt's remarks on altitude and its influence on the blood corpuscles, and it quite agrees with one's previous ideas on the matter. I am

convinced that as a general rule anæmic patients do not do well at the seaside, and I also believe that although many who come from a low-lying and damp locality with anæmia will improve rapidly at the seaside, yet that they will do better at an inland elevated locality. It is also a fact that cases that become anæmic at the seaside are much more difficult to cure with the ordinary remedies unless they are removed inland. I have seen most severe cases of anæmia at the seaside and they have been so ill that one feared a fatal result from prolonged vomiting and consequent exhaustion, and other complications. One case improved at once on removal to a London suburb and lapsed again on return.

No doubt Professor Beneke's experiments showing that there is greater tissue change at lower altitudes than at high ones may explain this, the anæmia being caused by the waste of tissue not being sufficiently or quickly replaced. Many people are never well at low altitudes, and of these anæemics form a large proportion.

These are no more than general conclusions formed from personal experience. It is a great pity that exact observations cannot be made by the general practitioner by means of the hæmocytometer, hæmoglobinometer and other methods, but the initial cost of the instruments and the time taken up in registering the observations precludes its being done. Yet I am sure that until more numerous and exact data are chronicled by a large number of observers at different localities we shall be unable to speak very definitely as to the suitability of this or that place for anæmia.

Dr. BEZLY THORNE said: He laboured under the disadvantage of not having heard what had been said before, therefore would not engage in comment, but would endeavour to give in a few words the result of his own experience, gathered in twenty-five years of general practice and about six years of special practice connected with heart affections. From the first he had been struck by the fact that he had never seen a case of chlorosis, or of that form of anæmia in which a sallow complexion is partly hidden by those degenerated capillary vessels which lead to the subject being congratulated on

having the colour of robust health, in which there was not an habitual excess of urates or of uric acid in the water. In such cases it nearly always transpired that the patient was a very small drinker; some did not take more than three-quarters of a pint of fluid per day, and others thought they took a great deal if the quantity reached a pint and a half. Then what they did drink was tea, coffee, claret, and perhaps Burgundy, every one of which was charged with tannic acid to such a degree as to neutralise largely the amount of water in them, and to exercise an inhibitory influence on the kidneys. Twelve or fifteen years ago he was much struck by an observation made by Dr. Archibald Garrod in a paper, that the amount of corpuscles in the blood was in inverse ratio to the amount of uric acid in the patient's system.\* That bore out what had been said that evening, notably by Dr. Haig, and it corresponded with his own observations. What had been said about climate was extremely interesting in that connection. His conviction was that the basis of those complaints was gastro-duodenal catarrh. Exactly in proportion to the hygroscopic condition of the atmosphere, and exactly as that was aggravated by cold, so would the prevalence of gastro-duodenal catarrh vary, and according to the extent of the latter so would the fermentation of the food vary, as also would there be partial or complete closure of the common bile duct cutting off the supply of biliary and pancreatic juice from the food. Those were the conditions which caused the urine to be loaded with urates and uric acid, and which were universally found in chlorosis and the form of anæmia he had mentioned. He had never met with such cases in which there was not a deficiency of bile in the motions. He thought a large amount of the failure in the treatment of those conditions arose from neglecting to observe the character of the evacuations.

Dr. Pagan Lowe had spoken of the fact that in cases of anæmia there were loose actions of the bowels. It seemed to have escaped the observation of many that the rectum was second only to the stomach in power of absorption. Where stricture of the œsophagus existed, the patient could be kept

alive indefinitely by putting digestive food into the rectum, and yet in cases of high blood pressure and anæmia one heard great stress laid upon constipation. The amount of septic absorption occurring in constipation was not to be compared with that which occurs where there were loose motions. Nature had devised that the motions should be solid when they reached the rectum, so that the person should be protected from poisoning due to them.

Thus, to a great extent due to the influence of climate, there was gastro-intestinal catarrh and auto-toxis. What was the result? In every one of those cases there would be high blood pressure, because of those elements in the blood which caused arterial contraction, and if that condition were long maintained sufficient nourishment was not conveyed to the heart muscle, and that organ became dilated. There were few cases of anæmia in which there was not some degree of cardiac dilatation. The amount of high pressure was exactly the measure of uric acid and its allied toxins in the blood. A young man aged 18, with commencing Graves' disease, was shown at the Clinical Society; 120 mm. of mercury would be a reasonable pressure, but his was 220 mm. That man was passing three or four yellow, ragged, loose motions a day, containing much mucus, and that was the cause of his high pressure. It was useless to try to restore the blood corpuscles in a person loaded with uric acid. Such patients might be given iron, which might promote the production of corpuscles for a time, but when the iron was discontinued the condition relapsed. He took up Dr. Pagan Lowe's challenge, who asked who would dare impugn the value of iron? He (Dr. Thorne) had seen more improvement effected in a fortnight under iodide of potassium, lithia, and bismuth, than by years' administration of Bland's pills. One of the reasons why the Schott-Nauheim baths and exercises were so successful as adjuvants in the treatment of anæmia was, that they promoted elimination, for one of the first effects of the treatment was an abundant diuresis.

Dr. W. BAIN (Harrogate) said: That amongst the constituents of the urine he had estimated in cases of anæmia were the conjugate sulphates. In pernicious anæmia it had

been noted that the conjugate or ethereal sulphates were increased, and they were so in the case he tested. He put the patient upon chloralabacid, a comparatively new intestinal disinfectant, consisting of albumen and chlorine, but it had no effect upon the ethereal sulphates. The latter were also increased in cases of gastro-intestinal putrefaction. Pernicious anæmia he did not believe to be due to a septic influence, but to some form of gastro-intestinal disturbance. Dr. Pagan Lowe used the phrase "pathological urobilin"; but urobilin was simply the same substance whether it was of pathological significance or not. Of course urobilin and indican were both increased in anæmia.

With regard to uric acid, they had heard much that evening from Dr. Haig and Dr. Bezly Thorne on this point, but he believed animals had been experimentally fed on uric acid for considerable periods without producing any change in their metabolism. He took the average of twenty-one days' excretion of uric acid in a case of pernicious anæmia, and also the average of four days' estimations in chlorosis. In pernicious anæmia the average was .583 gramme, a moderately low average excretion. In chlorosis it was 1.2 grammes. That was a considerable difference if the two diseases were due to uric acid. Dr. Haig had stated that those who took meat diminished their blood decimal. He (Dr. Bain) took meat daily, and his hæmoglobin value was 103 per cent., while the corpuscles were normal. It was a remarkable fact that most of the cases of anæmia practically took no meat, and the first thing he did was to put them on a meat diet. Allusion had been made to Professor Allbutt's remark about the diminution of red cells in chlorosis; his (Dr. Bain's) own experience corroborated that statement. The obvious explanation was, that if the plasma was increased, the red cells would show a diminution relatively to the plasma. Dr. Lorrain Smith's observations on that point were very important, viz., that the volume of the blood was increased in chlorosis and pernicious anæmia. Physiologists did not quite accept his conclusions as absolutely correct, as the methods adopted were not free from fallacy, but for comparative purposes the methods were

of value. Haldane showed that the oxygen capacity of the blood was increased in chlorosis, but not in pernicious anæmia. It was well known that the plasma could dissolve oxygen, and if the red blood corpuscles were very poor in hæmoglobin it was better for the patient if the blood volume was increased. If chlorosis was due, as Sir Andrew Clarke thought, to intestinal putrefaction, or ptomaine poisoning, one would expect the sulphates to be increased, but they were not.

Professor Allbutt had mentioned that he had not seen any explanation given of the fever which sometimes occurred in anæmia and chlorosis. When sudden hæmorrhage occurred there was a fall in blood pressure, and the temperature became subnormal ; then a reaction occurred, and the blood pressure and temperature were both raised. A plausible explanation was, that the temperature was raised owing to diminished heat loss ; but he thought most physiologists were agreed that the rise in temperature was due to the anæmic condition of the blood having a disturbing effect on the heat centre.

Dr. SOLLY (Harrogate) said : He would devote his remarks to commenting on some of the observations which had been made. It occurred to him that if anæmia was only a question of the amount of uric acid in the blood, one's treatment of it could be very much simplified, but he could not feel that the matter was so simple. Many cases of anæmia were sent down to the health resort at which he practised. A few years ago he started with the idea that, as in Harrogate there were sulphur as well as iron waters, the sulphur waters would do for cases of gout and the iron waters for the anæmics. He soon found, however, that the iron waters were often disappointing in the case of the anæmics, and that waters having a greater eliminative action, such as the sulphur ones, were very beneficial. That brought him into apparent contrast with the views expressed by Dr. Fortescue Fox, who said that sulphur waters sometimes produced rather than cured anæmia. He did not know whether the explanation he (Dr. Solly) had to offer would bear investigation, but he thought it was that the Strathpeffer sulphur waters were almost free from salines,

whereas the Harrogate sulphur waters, in addition to the sulphur, contained considerable amounts of salines, and possibly the eliminative action of the latter overbalanced any bad effects of the sulphur. There were waters at Harrogate of three or four different strengths, and he had often found that the weaker iron ones were far more useful to anæmics than the stronger ones, and going a little further, that in many cases it was not the iron waters at all which produced benefit, but the sulphur waters containing quantities of salines, which latter aided very much in the elimination of poisons from the blood.

He was inclined to agree with the remark of Dr. Fortescue Fox regarding baths, namely, that the water should be cool, not hot. On a patient of his (Dr. Solly's) who was suffering from anæmia of an obstinate type, he tried all the usual remedies, but without benefit. He accidentally learned one day that the patient was accustomed to take hot baths, but she did not know at what temperature. She tested the water on the next occasion, and found it to be at 120°, which she had schooled herself up to tolerating. On discontinuing those baths she at once improved, and the anæmic condition disappeared practically. He understood that the Japanese were in the habit of taking very hot baths, but there might be some national peculiarity which rendered them immune to the effects.

Dr. HAIG said: Dr. Bain mentioned one case of pernicious anæmia, and one of chlorosis, and stated the amount of uric acid which he found, but omitted mention of the amount relative to the urea. He (Dr. Haig) always took the ratio of uric acid passing through the blood to the urea. Again, Dr. Bain said he estimated the hæmoglobin, but did he estimate the blood cells? He reminded the meeting that he (Dr. Haig) was dealing with the blood decimal.

Dr. BAIN, in reply to Dr. Haig, said: The urea in chlorosis was 28·81, uric acid 1·2 grammes. In pernicious anæmia the urea was 33·569 and the uric acid ·589. The ratio in pernicious anæmia was 1 to 66, and the ratio in chlorosis 1 to 24.

The PRESIDENT said the discussion, extending over two

evenings, had been very gratifying, and it would be futile for him to do more than follow the debate, which was so admirably introduced by Professor Clifford Allbutt. But he might recall the fact that the discussion was intended to be not only on the nature of anæmia, but on its treatment, especially in relation to baths and waters—the object for which the Society existed—though the members were all pleased to have heard the views on causation. He thought it was right to leave to some extent on one side the direct anæmias. They had rightly heard a great deal about chlorosis. A point which was well brought out by Professor Allbutt was the relation of chlorosis to the hygroscopic condition of the atmosphere. He could not help feeling that they had to thank the hygroscopic condition of the air very largely for the prevalence of anæmia in particular districts. Dr. Leon had well pointed out how metabolism was apt to be defective in a relaxing atmosphere, and the opener of the debate had clearly shown how improvement came about in dry, even though low-lying, districts. It followed from those facts that not only was the climatic treatment a matter of importance, but so also was the medicinal. He thought the discussion had clearly shown that an eliminative treatment gave most satisfaction in chlorotics, though whether on account of the removal of uric acid from the blood or not he could not say. The drug which should rank next to iron for chlorosis was sulphate of magnesia, or aloes. He thought iron *plus* sulphate of magnesium would result in the cure of most chlorotics. That baths were exceedingly useful he believed was the testimony of all who used them—he alluded especially to the Nauheim treatment. In chlorosis there was certainly considerable dilatation of the blood vessels and the heart; and that was admirably met by cool saline waters, together with eliminative treatment.

Dr. PAGAN LOWE, referring to Dr. Bezly Thorne's remarks, said: If it were correct that in cases of anæmia there was gastro-intestinal catarrh, with partial occlusion of the common duct, one would expect to see definite jaundice, but he (Dr. Lowe) had not seen that in anæmia. He also thought Dr.

Thorne's statement that the rectum was second only to the stomach in absorptive power might be questioned. He quite thought that if the bowels were blocked up there would be increased opportunity for the absorption of ptomaines.

Dr. SUNDERLAND : I must confess to a feeling of disappointment that in this discussion we have had so little expression of opinion as to the effect on anæmic conditions of the climates of the health resorts of Great Britain.

We have heard the remarks of Drs. Snow, of Bournemouth, Larking, of Folkestone, and Leon, of Sidmouth, but we have not had the experience of any of our Fellows residing at the northern sea-shore resorts, either on the east or west coasts of England or Scotland, concerning the effect of their climates on anæmic patients who go there to reside for any length of time.

In the book published by the Royal Medical and Chirurgical Society on the climates of the south of England, the statements of local observers on the south coasts as to the prevalence and cure of anæmia, are somewhat conflicting, considering the proximity of some of the towns to each other, and the similarity of their climates ; but of course it is probable that patients suffering from anæmia may improve if staying for a short time at south coast resorts, owing to the increased metabolism and exercise in the open air, although anæmia may be prevalent among the residents. This book deals also with the Isle of Thanet, and the reports as to the beneficial effect of the climate of its towns on anæmia stand out distinctly.

One point, and that which I myself believed to be correct before this discussion was begun, appears to be fairly firmly established by that portion of the debate bearing on experiments and the pathology of the disease, namely, that moist, damp, low-lying and "relaxing" neighbourhoods, especially where the humidity is combined with a low temperature, either at the sea-shore or inland, are contra-indicated in cases of anæmia. One must therefore conclude that if wishing to select a sea-shore health resort in this country for an anæmic patient, one would be more inclined, especially in summer

time, to choose one on the east or north-east coasts of England and Scotland, where the moisture-laden winds from the west and south-west have been deprived to some extent of their humidity during their passage overland, and where the dry east and north-east winds first reach the shore ; bearing in mind that some of the south coast resorts (even those where anæmia itself is prevalent) may also be helpful to some cases for a time, especially if a moderate amount of exercise be taken and the patient be kept as much as possible out of doors.

And since we have not a hot dry climate similar to that of Egypt, where, judging from Dr. George Oliver's observations on the changes in the blood of visitors soon after their arrival (mentioned by Dr. Clifford Allbutt when opening the discussion), chlorosis should be benefited, the indication *par excellence*, in this country, seems to be to advise anæmic patients, for whom one wishes to gain the advantage of climate as well as that of drugs, to sojourn for a time at a high, dry and bracing place, not too thickly surrounded by trees, such as parts of Malvern, Harrogate, Buxton, Llandrindod, Hindhead, Tunbridge Wells, Crowborough (the latter only in the summer months). And in England and Scotland there are numerous dry elevated spots to be found suitable for such cases, although they have no definite reputation already achieved as health resorts. For instance, within a reasonable distance of London we have the elevated North Downs, commencing as a ridge of chalk at the Hog's Back, in Surrey, widening gradually and extending eastward across the county of Kent to the sea, on which numerous suitable places can be found. Also north of London we have the Chiltern chalk hills, many parts of which are eminently suited to the requirements of anæmics in so far as we have ascertained from this discussion. I believe these chalk hills on the North Downs and Chilterns, where the air is peculiarly dry and bracing, would be particularly suitable for chlorotics and for the anæmia produced by hæmorrhages, especially the menorrhagia described by Dr. Percy Lewis in his remarks, and also for the anæmia produced by chronic uterine hæmorrhage from other

causes, such as subinvolution of the uterus after child-bearing, bleeding fibroids, &c.

I have previously supported this view with regard to the anæmia of hæmorrhage in a paper published in the JOURNAL OF BALNEOLOGY AND CLIMATOLOGY, in January, 1898, based on a report of some cases of uterine hæmorrhage in which the bleeding had diminished to a remarkable extent while the patients were sojourning at high dry altitudes, the concomitant anæmic condition being also improved.

The remarks of Dr. Percy Lewis concerning menorrhagia induces me to point out that I have often noticed that a large number of women suffer habitually from a slight degree of chronic anæmia, on account of losing more blood at their menstrual periods than is normal, and more than they can afford, and yet they go on for years and years without knowing this, and without their ordinary medical attendant getting the clue to the cause of their condition, or being informed that the periods are too profuse or frequent. It is of course difficult to determine what is a normal amount of menstruation for any individual woman, and what loss of blood she can satisfactorily sustain without injury to health; it is a common thing for people to have abnormal vision during the whole of their lives without being aware of the fact, and it is, in my opinion, also common for women to have too frequent and too profuse periods without ever thinking there is anything abnormal in their condition. It is for anæmia of this origin that a high dry climate in addition to drugs should be beneficial, especially because the menorrhagia would probably also be relieved.

Referring again to the experiments of Dr. Oliver in the hot, dry climate of Egypt, I would like to know whether observers in this country have noted the relative frequency of cases of chlorosis in summer and winter-time; one would assume that during the dryer, warmer months of the year chlorosis should be less common than during the winter.

With regard to drug treatment in cases of chlorosis I was interested to hear from Dr. Thorne of the beneficial effects he secures from the action of bismuth, iodides and lithia. Most

of the speakers appeared to agree as to the beneficial effects of "elimination." I remember years ago Dr. Paul Chapman, now physician to the Hereford Hospital, taught me the value of sulphate of magnesium and sulphate of sodium in such cases. During an experience of fifteen years at the Royal Hospital for Children and Women I think I must have treated from eight to ten thousand cases of chlorosis. We all get attached to our pet mixtures, and my plan for the past ten years has been to give for a week or two, to those chlorotics, complaining of dyspepsia, a mixture of sodium bicarbonate with gentian (and sometimes bismuth), and a morning dose of sulphate of magnesium or sodium as an aperient, and afterwards (or from the beginning of treatment to those not complaining of dyspeptic symptoms) a mixture containing magnesium sulphate, citrate of iron and ammonium, aromatic spirit of ammonium and tincture of nux vomica. Perhaps some of my success in treatment has been due to this apparently polypharmacial jumble; it has amused some practitioners, it has pleased me, and has served its purpose—that of curing probably 99 per cent. of the cases in a short space of time. This is satisfactory in a large out-patient department.

On considering the views expressed by the different speakers, one or other or several of the drugs in this Maxim gun prescription appear to fall in with the scientific or practical views of most of them. The sulphate of magnesium would be useful according to the uric acid and the gastro-duodenal catarrh theories, and would also reduce the excessive plasma: it also meets the views of the advocates for "elimination": the iron will be satisfactory to most speakers: the nux vomica and sal volatile should certainly be beneficial to the dilated hearts of chlorotics and produce also a tonic and bracing effect by its action on the nervous system when climate and baths cannot be added to the repertoire of treatment. I may add that I usually advise moderate exercise in the open air, together with some modification of the dietary—abstention from tea, &c., and in the severe cases a preliminary rest in bed.

In conclusion, I would like to ask Dr. Bezly Thorne the

following questions : If, as he believes, chlorosis is caused by gastro-duodenal catarrh—(1) why is chlorosis not common in young men and (2) why should young women have gastro-duodenal catarrh more frequently than young men ?

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The second General Meeting will be held at 20, Hanover Square, on Friday afternoon, May 31st. The Annual Dinner will also be held at Limmer's Hotel, Conduit Street, W., on Friday, May 31st, at 7 p.m. At 9 p.m., the same evening, the Annual Conversazione will take place at 20, Hanover Square. Dr. Burney Yeo will deliver an address entitled "Hepatic Inadequacy." Fellows are requested to give early notice of their intention to dine.

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DR. IVOR MURRAY requests us to state that in a recent number of the Journal he was credited with having been present at the siege of Lucknow with Sir Joseph Fayrer, and that this was an inaccuracy. As a matter of fact it was during the campaign in the Crimea that he served with Sir Joseph Fayrer.

## Original Communication.

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### RHEUMATOID ARTHRITIS.

BY J. G. DOUGLAS KERR, M.B. (BATH).

(Concluded from p. 289, November, 1900.)

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OF all the diseases which predispose to rheumatoid arthritis, influenza in recent years, seems to take first place. Quite a large proportion of the cases which have come under my observation fix the commencement of their illness with perfect certainty to a time closely following an attack of influenza. This disease also seems to exercise a specially baneful influence on patients suffering from rheumatoid arthritis. I have met with many patients whose rheumatoid symptoms had yielded to treatment and become quiescent, and who were well on the way to recovery, in whom the disease took on renewed acute manifestations as the result of an attack of influenza. Next to influenza as a predisposing cause, I should place the strumous and phthisical habit. A careful investigation of the family history of rheumatoid patients will, I think, give proof of the correctness of this selection. Among women, the disproportionate frequency of the disease is undoubtedly due to their greater liability to inflammatory and catarrhal affections of the organs of generation, and the risk attending confinement and miscarriage. Among other predisposing diseases may be placed gonorrhœa, acute tonsillitis, and suppurative sore throats, rheumatism, typhoid fever, malarial fevers, syphilis, abscesses, pneumonia, and bronchitis; severe and prolonged strain and worry, especially when accompanied by loss of sleep; chill, and exposure to damp and cold (this is verified by the interesting fact that the disease has been found in five out of sixteen skeletons of gorillas examined in various European museums, the native home of the gorilla being in the depths of the African forests, which are typically damp and sunless); nerve shock. In regard to this, I remember one very typical case

where a woman, previously healthy, developed very acute rheumatoid arthritis within a month of the shock caused by finding her husband, who had committed suicide by cutting his throat, in their bedroom. Before passing from this subject of predisposition, there is one point which I have not seen mentioned by other writers, viz., the necessity of carefully examining the teeth of all patients threatened with rheumatoid arthritis. Many of them have decayed stumps, and also that condition known as pyorrhœa alveolaris, in which an apparently sound tooth is loose in the socket, which is discharging pus. If either of these conditions exist there can be no more favourable location or mode of entrance of the infective germs into the system.

There may be some premonitory symptoms, but they are hard to verify, and are not by any means constant in their manifestations. Some patients complain of transient nerve pains in different parts of the body, the most frequent seat of pain being the inside of the wrist and ball of the thumb; others complain of local sweatings over the joints before there has been swelling or any other joint manifestation. Dr. Spender first drew attention to the peculiar pigmentation of the skin, since known as Spender's Spots. This symptom may be present for months, or even for years before the joints become actively affected.

In three or four cases which have been under my observation for fairly lengthened periods before the outbreak of an acute attack of rheumatoid arthritis, I have noticed a persistent condition of subnormality of temperature, ranging down to 96.8 or 97, with little variation between night and morning. While I consider this point worth mentioning, I have not seen a sufficient number of cases at this stage to determine whether it is a constant premonitory symptom or only accidental. The experience of others may tend to clear up the point.

A rapid pulse, running up in many cases more or less constantly to 120 or even 130 per minute, is also a fairly constant premonitory symptom. With such a quick pulse one would expect a rise of temperature; but, far from this

being so, in three of the four cases mentioned above the pulse rate averaged 116 to 124, while the temperature was at 97 or 97.2.

Whether there have been premonitory symptoms or not, whether the disease is one of first instance or following on one of the predisposing ailments already mentioned, we cannot class a case as one of rheumatoid arthritis until the typical joint affections have manifested themselves, and then there can be little doubt that we have to deal with a specific disease with strongly-marked characteristics.

As has been said in the earlier portion of this paper, the disease is common to both sexes, though much more frequent among women. It may attack the young or the old, the rich or the poor; it may commence as an acute disease, or take from the first a more chronic type. These two varieties are fairly well distinguished by their symptoms and progress. In their early stages they are very dissimilar, but the chronic stages of an acute attack (provided it is running a favourable course and tending to recovery), will present many features closely resembling an attack which has been chronic throughout its entire course. I do not think anything but confusion has arisen from the various elaborate classifications which have been attempted of rheumatoid arthritis. I will, therefore, discard them all, and describe the disease as I find it, clinically, under two heads—acute and chronic.

Among acute cases (usually polyarticular) I would include all those, whether occurring in children, early life or adults, manifesting acute inflammatory changes in the joint structures which lead to considerable alteration in, or destruction of, the joint tissues. In slight and early-checked cases these inflammatory changes may only affect the synovial membrane, but they usually spread deeper and end in erosion and destruction of the cartilages and bony surfaces. In the chronic variety I would place those more slowly progressive cases, mostly met with in adults or advanced life, not characterised by acute inflammation and destruction of joint tissues, but rather by a slowly progressive chronic inflammation, which leads to deformity by a thickening and hardening

of the joint structures, by outgrowths from the bony ends and lipping of cartilages. These latter cases are described by some authors under the separate name of osteo-arthritis, but as in my opinion they are distinctly rheumatoid, I think it saves confusion to class them as the chronic condition of that disease. There is certainly no greater dissimilarity between those two conditions of rheumatoid arthritis than there is between the acute and chronic forms of rheumatism and gout, as we meet them in every-day practice.

In a typical acute attack of rheumatoid arthritis the first symptom which can be relied upon with any certainty as diagnostic is swelling of a joint (having started in one joint it rarely remains localised, but becomes polyarticular). In a large percentage of cases it is one of the joints of the hands, and more frequently the finger, which is first attacked. Garrod found 252 out of 500 cases began in the hand. Out of 156 cases in which I could get definite information I found 46 per cent. commenced in the hands, and of these 87 per cent. began in the fingers. In the early stage swelling is the only symptom—no pain when the joint is at rest and only very slight pain on movement. As the swelling increases, the joint assumes a typical spindle-shaped appearance; the natural markings of the joint become obliterated, the greatest enlargement being over the articulation, and tapering above and below. The amount of swelling varies greatly in different cases, from a small fusiform enlargement of the joint to a deformity three or four times greater than the original circumference of the joint. At first the swelling may be localised to one part of the joint; then it becomes more regularly spindle-shaped, and later on often shows localised protrusions in the position of least resistance to synovial and fluid pressure from within and bony outgrowths. In the early stage, the skin over the affected joints shows no change beyond the loss of natural creases from tension; in some cases there may be a faint blush over the surface, but nothing like the redness of an ordinary inflammation. Later on the skin assumes a waxy appearance, or may be bluish or dusky, and is often rather mottled.

The presence of Spender's brown pigmented spots in the neighbourhood of the affected joints should be noted if present. A very characteristic symptom, and one of very general occurrence, is localised sweating over the affected joints, often to such an extent as to keep the surface covered with small beads of moisture at the orifice of the secretory glands. The temperature of the joint varies with the stage of the illness: at first there is no change; later on there is a distinctly perceptible local rise of temperature; the joints feeling hotter to the touch than the neighbouring parts, and that there is an actual rise of temperature can be demonstrated by a surface thermometer. Later on the joints feel cold and clammy, while in the larger joints the surface temperature may vary at different points. To the touch, a tense elasticity is the character of the early stage; later on, fluctuation, at least over certain areas, is added. As destruction of tissue progresses, we get the natural results; a swelling, in places tense, in others fluctuant, with a soft boggy or doughy feel; parts in which there is evidently sacculated fluid, and others which give a sensation of eggshell crackling where the bony epiphyses are undergoing degeneration. There is also very constantly crepitation on movement. Later on, when the acute is verging into the chronic stage, the swelling decreases, assumes more irregular shapes, and hardness becomes its characteristic instead of softness. While no joint in the body is sacred to the invasions of rheumatoid arthritis, the small joints are its much more frequent seat of origin and location. Garrod gives the following percentage of frequency: hands, 86.0; knees, 60.4; ankles, 34.4; elbows, jaws, and shoulders, 25.0. My own experience, while corroborating the high percentage of cases in which the hands are affected, would place the elbows at a higher ratio than the knees or ankles, and the neck equal with, or above either, in its liability to attack. A point of very considerable diagnostic importance is the frequency with which the temporo-maxillary joint yields to the inroad of rheumatoid arthritis; the joint being fairly immune from other disorders, and hardly, if ever, touched by gout or rheumatism. When

once rheumatoid arthritis has begun, a characteristic of the disease is the wonderful symmetry by which the joints become subsequently affected; the symmetry not only being marked as to the joints affected, but also as to the time of invasion. The joints subsequently affected are those higher up the limb, rather than those lower than the one first attacked.

Compared to swelling, pain is an indefinite symptom in the early stages. It is always trifling and may be entirely absent during all the acute stage. It is characteristic of rheumatoid arthritis that the pain is much less than might be expected taking into consideration the very grave pathological changes which are taking place in the joint structures, ending in their more or less complete destruction. A very trifling attack of gout will give more pain than the most acute attack of rheumatoid arthritis I ever met with; the pain in the early stage is only developed by movement and differs from the pain of rheumatism in the fact that it is relieved by rest and warmth in bed at night, while rheumatic pains are then developed. The pain of an acute attack is usually localised to the joint affected, but in rheumatoid arthritis, over and above the pain in the joints, there is usually a dull aching neuralgic pain, extending both up and down the limb from the seat of the disease. This pain seems to follow the course of the muscles rather than that of the nerves, and is undoubtedly due to the disease affecting the muscles themselves, which undergo rapid degeneration. Neuritis is fairly frequently met with in rheumatoid arthritis in its later stage, and may be due to a spread of the inflammation from the joints, or to the direct infiltration of micro-organisms within the nerve sheath. The part of the nerve affected is usually proximal to the joint which is the seat of the disease. The general nervous system ultimately becomes affected, and is responsible for many of the later constitutional disturbances; the most marked of these is the change which takes place in the skin. The bluish appearance and localised sweatings of the skin covering the affected joints has been referred to. Besides these, there is usually pro-

nounced coldness of the hands and feet, with profuse sweating of the palms and soles. There is also present in many cases a highly glossy, almost varnished appearance of the skin, which has become white, smooth and denuded of hair. This is most seen below the elbows and knees, on the outer surface of the arm and hand, and anterior surface of the leg and foot. The skin at times becomes indurated and scaly, with a dead white opaque appearance. Often, before the skin, the muscles show the invasion of the nerve system ; muscular atrophy being one of the earliest and most reliable symptoms of rheumatoid arthritis. The wasting takes place throughout the entire length of the muscle. It is usually the extensors and interossei which suffer most severely. This muscular atrophy is out of all proportion to what can be accounted for by simple disuse, and is probably due to two causes, acting separately or together, viz., a direct local attack, or to the peripheral nerves of the joints. To the muscular atrophy and subsequent contraction are due many of the typical deformities of the disease in its more advanced stages. Joints quite free from the rheumatoidal attack are frequently affected by these muscular contractions, and may become fixed, or terribly distorted and dislocated. A powerful diagnostic aid is the marked uniformity with which these deformities affect certain joints in different cases. The most typical, perhaps, is the ulnar deflection of the fingers at the knuckles. At first this deflection can be rectified by passive movement, but later on it becomes permanent and irreducible ; there is also a tendency to flexion at the wrist joint, which may be either a simple flexion of the hand on the forearm, or this combined with more or less ulnar flexion. The elbows and knees also tend to become flexed, and sometimes even dislocated. When the disease progresses to the stage of bony destruction there is no limit to the deformity which may take place in any given joint. As might be expected, the tendency is in the direction of greatest muscular strain and least support from capsular or ligamentous resistance. In cases where the wrists or knuckles are affected it is not uncommon to find one or more of the fingers dislocated backwards at the

first joint, which gives to the hand a striking and typical appearance. It is towards the end of the acute stage, or where it is become verged into the chronic, that these deformities become most marked.

The glands proximal to the joint or joints affected, not infrequently become enlarged and indurated, but never, in my experience, suppurate. In children the spleen may occasionally be found enlarged.

Before the disease has long manifested itself there is considerable constitutional disturbance; fever, but not, as a rule, beyond  $100^{\circ}$  to  $101^{\circ}$ ; high arterial tension and increased pulse rate; stomach, biliary and intestinal disturbance; loss of weight, frequently rapid and extreme; sleeplessness, restlessness, and sometimes involuntary jerking of the limbs, and a pronounced and very obstinate anæmia.

At the opposite extreme from the symptoms just described are those of a typical chronic case: the whole disease is much slower and less severe; little or no fever, but slight rise of local temperature; slight, if any, constitutional disturbance, but often marked and obstinate muscular wasting and contraction. This disease is much more frequently monarticular, though its tendency is to spread to other joints. Its usual location is the smaller joints; in quite a large percentage of cases the terminal joint of the fingers. Where it is progressive one joint after another becomes affected with slow chronic inflammation, is painful for some weeks or months, enlarges and hardens by bony outgrowths and lipping of cartilages. This leads to loss of function and considerable deformity, but as a rule pain is of short duration. The inflammatory stage passes and only the deformity is left. The cases which are chronic from the start are not, as a rule, serious; very different, however, is it with the chronic stage of an acute attack; there, in all probability, the larger joints have become affected, great destruction of tissue has taken place in the acute stage, so that the subsequent hardening leads to greater loss of function and deformity. The best that can be hoped for in bad cases is a subsidence of the destructive changes and fixation of the joints by induration of the tissues.

A glance at the pathological changes characteristic of the two stages will explain many of the symptoms. In the acute stage the synovial membrane becomes thickened, pulpy and granular, with enlarged villi, which may become detached and give rise to what has been well described as melon-seed bodies in the joints. From pressure and movement this diseased synovial membrane becomes rubbed through, leaving the cartilages bare. The cartilages, either soon after the synovial membrane, or, as some authorities claim, in the first instance, become affected. The articular surfaces become dull, the whole cartilage thickens, softens, and may even become eroded, leaving bare bone. There is a tendency to proliferation of cartilage, and if portions become detached, as is not uncommon, this gives rise to loose cartilages, which are often met with and which cause much subsequent trouble. Following the synovial membrane and cartilages, the bony surfaces become eroded and the disease spreads, or concurrently with the others the bony epiphysis becomes affected, the bony tissue softens from proliferation of soft marrow-like cells, the bony salts are absorbed, leaving the bone ends soft, enlarged, and liable to erosion, or to take on abnormal shapes from pressure. The tissues round about the joints share in the general inflammatory condition and become soft and enlarged. In the chronic stage of an acute attack the synovial membrane, or what is left of it, undergoes absorption and fibrous change, giving rise to fibrous adhesions, which tend still further to impair function. The cartilages also harden, and while shrinking over the articular surface, tend to increase the lipping at the edges by proliferation of cartilage cells, which become piled up one on another, forming large masses, which may become detached, or go on to develop slowly into bone. These bony masses become condensed, ivory-like in structure, and highly glazed on their articular surface: to this condition the term *eburition* has been applied. With so great erosion of cartilage and destruction of bone surface one would expect ankylosis to be a common result, but, as a fact, it is very rare and hard to procure, even when deemed advisable as a treatment in bad cases. The fixation

which so commonly results is due to firm fibrous adhesions forming in the synovial tissue ligaments and tissues surround the joints, and also to the contracted and hardened conditions of the muscles which regulate the joint movement. This gives some hope that when the entirely chronic stage is reached some function may be restored by the careful and gradual breaking down and absorption of these adhesions. Anything like rough handling is very apt, however, to set up inflammation once more. One of the most difficult points in the treatment of a case of rheumatoid arthritis is to determine when the exact time has arrived for surgical interference in any one joint: for this it is impossible to lay down rules, nothing but a large personal experience is of any avail. In the mild type of cases which have been chronic throughout and only affected the smaller joints of the fingers, the resulting deformity, though disfiguring, is of little ultimate importance; the pain subsides, and often the swelling and stiffness tend to improve. The pathological changes in the muscles are very marked; the shrinking in the actual bulk of the muscle, which extends to its entire length, is due to a degeneration of the individual fibres, rather than to a destruction of certain of their number. The ultimate hardening and shrinking is due to a formation of fibrous tissue. The anæmia, which is so characteristic a condition of advanced rheumatoid arthritis, is due to a diminution in the number of red blood corpuscles, but still more so to a marked loss of the normal percentage of hæmoglobin.

I have purposely left one form of rheumatoid arthritis to be described by itself, viz., what is often called morbus coxæ senilis, chronic rheumatic arthritis, monarticular rheumatic arthritis. A chronic condition of advanced age, usually attacking one hip joint, but sometimes present in both hip joints and also the shoulders. In opposition to the opinion of some authorities, I regard this disease as distinctly rheumatoidal. It is more common in men than women, and rarely spreads to the smaller joints, though a chronic case beginning in the fingers may ultimately spread to the hip. The first symptom is pain in the neighbourhood of the hip joint, but not infre-

quently most marked in the neighbourhood of the knee, and increased when the patient tries to cross the affected leg over the other. To save pain the patient stands on the sound leg, and draws up the pelvis on the affected side : gradually this contortion becomes permanent and irreducible, and much of the ultimate shortening of the limb is a false shortening, due to the uplifting of the pelvis, rather than to the alteration in the angle of the neck of the bone, though some real shortening is due to this latter cause. The same marked muscular wasting and shrinking which characterises other forms of rheumatoid arthritis is also present here. The position of greatest rest is with the legs slightly bent at the knee and everted, and so these become the ultimate condition. There is some shrinkage of the head and neck of the bone, also an irregular nodulated condition of the head of the bone on its outer articular surfaces, which also takes place on the surface of the bony socket ; but the most marked and characteristic change is the great increase in the size of the trochanter and its immediate neighbourhood, which causes a hard mass to be felt on examination. The disease is slowly progressive in both pain and deformity, and if neglected may lead to entire crippling. The best of treatment is to encourage the patient to very carefully-regulated active and passive movement night and morning, enough to prevent loss of function, while avoiding all violent or excessive movement and jerking which tend to increase the local inflammation. Hot air baths, deep baths, with submerged douches, massage, and electricity, are also useful ; but it is well to warn the patient of the progressive nature of the disease. This remark applies to all forms of rheumatoid arthritis. Much ultimate trouble and recrimination is saved the doctor by frankly stating the case and warning the patient of the almost certain result as soon as the diagnosis is arrived at.

This leads me to say a word as to the prognosis of rheumatoid arthritis. A few years ago one was very despondent about these cases, but many recent successes have greatly modified this opinion. Being seen in the very early stage many cases can be cured, or the severity of the attack considerably

modified. The outlook is always grave and very tedious in acute cases, if not checked at the very start. The vast majority go on from bad to worse, until the acute stage has expended itself, or been checked by treatment. More, rather than less, crippling and deformity is the result. Cases seen and recognised very early in their development, when only one of two of the smaller joints are affected, are frequently checked and make an apparently perfect recovery ; but the tendency seems to remain, and some subsequent illness may set the rheumatoid arthritis going again, when, as a rule, it is much harder to arrest. I have one patient who has returned five times with fresh developments, when the former ones had apparently been entirely arrested, the interval between the attacks on one occasion being as long as seven years. Several patients have returned two or three times under similar conditions. Influenza seems to be particularly liable to set quiescent or apparently cured attacks going again.

As regards treatment, I prefer to generalise rather than enter into details, as each case has to stand and be treated on its own merits. The first great rule is to avoid, both by drugs and restricted diet, the slightest tendency to lower your patient. If there has been a predisposing cause, try and remove it. Change and freedom from domestic or business worries are essential ; the best hygienic and climatic surroundings ; a bracing air for choice ; the best of carefully regulated food ; warm clothing ; regulated exercise, avoiding fatigue, while the patient can still walk, and by carriage and massage when they cannot ; cheerful surroundings, both local and personal, and the removal of all strain, worry and boredom. In the early stage of an acute attack, when only one or two joints are affected, I have seen markedly good results follow the free use of the cautery, which may be applied under an anæsthetic. It is not always easy, however, to get the patient's consent to a repetition of the treatment. In the very acute stage rest of the joint is essential, and a splint may often be necessary, but rheumatoid arthritis is an exception to the general rule that an inflamed joint should be kept absolutely at rest. The tendency to fixation is so great, as has been explained while discussing

shortly the pathology of the disease, that occasional passive movement is essential to an ultimate good result : if pain is too severe, use an anæsthetic. Where a joint is so bad that the best we can hope for is fixation, see that it is secured in the position which will be ultimately the most serviceable : for example, a leg with a stiff knee, provided it is straight, is of little permanent inconvenience, compared to what it would be if the knee is fixed with the leg bent at a considerable angle, and the greater the flexion, the more the trouble. Also joints which have become fixed by adhesions are much more easily improved by surgical interference later on, when muscular contraction does not enter into the consideration. Knees, wrists and fingers should be fixed straight ; elbows fairly flexed, and hips slightly so. Great care should be taken to prevent, as far as possible, distortion of healthy joints by muscular contraction : thus, the backward dislocation of the fingers at the middle joint need never take place, and much deformity and misery be spared the patient. In the early stages of both acute and chronic cases, if I were restricted to one treatment, I should unhesitatingly choose the hot air treatment. Personally, I think the argument is strongly in favour of whole body and general constitutional treatment, rather than restricted local baths, and so use the Dowsing whole body apparatus, in which I think the combination of light and heat, plays a very important part. Again, in the chronic condition, some good can be derived from hot air treatment, and then it is possible that local baths may give the best results, provided only one joint or one limb is affected ; where many joints are affected the whole body bath should be used. Throughout the acute attack the patient should be confined to bed or sofa while there is fever, or pain on moving the joints ; arrangements should be made for plenty of fresh air, both day and night, and as early as possible the sick room should be changed for open air and sunshine. Massage, electricity, baths and douches are all useful in their proper places, and so undoubtedly is a visit to a suitable spa, either at home or abroad. There are few drugs in the pharmacopœia which have not been given a trial in rheumatoid arthritis. Roughly

speaking, the worst drugs are those which are most lowering, and the best those which combine a germicidal with a tonic or stimulant action. The iodides of potash and soda, colchicum, and the alkalies have been much used, and done much harm when rheumatoid arthritis was confounded with gout and rheumatism. In the early stage of the chronic, and throughout the acute condition, such drugs as guaiacol carbonate, creosote, carbolic acid, salol, salophen, iodine, and arsenic seem to yield the best results. Iodine and guaiacol can also be locally applied to the affected joints with advantage. Later on tonics are indicated, and perhaps iron, arsenic, phosphates, hypophosphates, quinine and salycine, alone or in combination, are the most useful. Many patients do well on cod-liver oil, when they can digest it. Feeding is a matter of the first importance ; during the acute stage it must be regulated to the patient's condition. Both milk, malted, and eggs should be given freely, and, as soon as permissible, a plentiful meat diet should be insisted upon, with a fair quantity of stimulant. Red wines and port developed in the wood are better than white wines or spirits, and, if the patient likes it, beer and porter may be used as an alternative.

On these lines one gives a patient the best possible chance; but, at the best, cases of rheumatoid arthritis must always be anxious, worrying and usually unsatisfactory from the medical point of view.

## BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL SOCIETY.

THE ordinary meeting was held at 20, Hanover Square, London, on Wednesday, January 30, 1901, Dr. Frederic Bagshawe, J.P., President, in the Chair.

The SECRETARY read the minutes of the last meeting, which were confirmed.

### RESOLUTION OF SYMPATHY.

The PRESIDENT said that before entering upon the business of the meeting he could not but think it was fitting that he should make a few remarks on a subject which occupied all their thoughts. Their thoughts must all go out towards the memory of the departed Queen, to the loving devotion which her subjects had been able to render to her for many years past. She had been a splendid Queen; she had grown up with our earliest thoughts, and associated with our everyday life. She had been also a Sovereign who had ruled over this country and made it the most magnificent and the grandest on the face of the earth—at least so they agreed to think. That she should have passed from us in the order of nature was to be expected, but that did not debar them from offering their homage, their thanks and reverence for the past. To His Royal Highness who had now succeeded as ruler of this country, and to the other members of the Royal Family, were due their sincere condolence, and that of every body of men meeting together, at the great loss sustained by them. That His Majesty the King would rule over the Empire with the same discretion that the late Queen had done must be the wish of all. He submitted the following resolution, which he was sure would be unanimously honoured:—

“That the Fellows of the British Balneological and Climatological Society, in meeting assembled, humbly approach His Majesty with an expression of our deep sorrow at the loss sustained by the Royal Family and nation at the death of our beloved Sovereign, Queen Victoria.”

The resolution was silently carried in the appropriate way.

The Chairman called upon Professor Clifford Allbutt to read his paper on "Anæmia and its Therapeutics."

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COPY OF MINUTES.

Ordinary Meeting held at 20, Hanover Square, March 15, 1901, the President, Dr. Bagshawe, in the Chair.

The minutes of last meeting were read and confirmed.

The following candidates were nominated for election at the next meeting :—

James Little, F.R.C.P., F.R.C.S., Dublin.  
Chisholm Williams, F.R.C.S., M.R.C.S., London.  
Roderick Sim, M.R.C.S., L.R.C.P., Monte Carlo.

The following candidates were elected by ballot :—

Octavius Hall, L.R.C.P., L.R.C.S., Stoke, Devonport.  
John Michael Nicholls, L.R.C.P., M.R.C.S., St. Ives.  
Walter Harry Dodd, L.R.C.P., L.S.A., Brighton.  
Gordon Sanders, M.D., C.M., Cannes.  
Norman Hay Forbes, F.R.C.S., L.R.C.P., Tunbridge Wells.  
Andrew Murdoch, M.B., C.M., Bexhill.  
Geo. Fred. Rossiter, M.B., M.R.C.S., Weston-super-Mare.  
T. H. Fagge, M.D., M.R.C.S., L.R.C.P., Monte Carlo.  
H. Pryce Mitchell, M.D., M.R.C.S., Monte Carlo.  
John Aymers Macdougall, M.D., F.R.C.S., Cannes.  
John R. Benson, F.R.C.S., L.R.C.P., Bath.  
Rolla Rouse, M.D., Monte Carlo.  
George Amy, L.R.C.P. & S., M.D. (Paris), Nice.

The PRESIDENT read a letter from the Home Secretary conveying the thanks of His Majesty King Edward VII. for the resolution of the Fellows of the Society on the occasion of the lamented death of Her late Majesty Queen Victoria.

Dr. PAGAN LOWE (Bath) resumed the discussion on "Anæmia."

The following Fellows and visitors took part :—Drs. ALEXANDER HAIG, WADDELL (Potter's Bar), KINGSCOTE, FORTESCUE FOX, ST. CLAIR THOMSON, BEZLY THORNE, BAIN (Harrogate), SOLLY (Harrogate), and the PRESIDENT.

## NAMES OF TOWNS WHERE FELLOWS RESIDE.

### ENGLAND.

ASHBY-DE-LA-ZOUCH. — Williams,  
Chas. R.

BARMOUTH.  
Lloyd, Hugh J.

BATH.  
Bannatyne, Gilbert A.  
Bayliss, R. A.  
Begg, Chas.  
Benson, John R.  
Bowker, George.  
Cowan, Frederick.  
Ellis, W. McD.  
Fraser, Forbes.  
Kerr, J. G. Douglas.  
King, Preston.  
Lace, Frederick.  
Lowe, T. Pagan.  
Mackenzie, Alex. L.  
Symons, W. H.  
Walsh, Leslie H.  
Wigmore, J.  
Wohlmann, A.

BEXHILL-ON-SEA.  
Wills, Joseph P. B.  
Joseph, A. H.  
Murdoch, Andrew.

BIRCHINGTON.—Harris, James S.

BIRMINGHAM.  
Foster, Sir Walter (Hon.)

BLACKPOOL.  
Kingsbury, Geo. C.  
Molloy, Leonard.  
Rhodes, T.

BOURNEMOUTH.  
Alderson, F. H.  
Gardner, T. F.  
Gardner, Wm. Thomas.  
Greves, E. Hyla.

Harsant, Joseph George.  
Hosker, J.  
Lys, Henry Crabham.  
Mahomed, A. G. S.  
Muspratt, Chas. Drummond.  
Nunn, Philip W. G.  
Scott, Thos. B.  
Snow, William V.

BRADFORD. — Campbell, Henr  
Johnstone.

BRIGHTON.  
Dodd, Walter H.  
Furner, Willoughby.  
Goff, Bruce E.  
Griffin, Wm. Watson.  
Hobhouse, Edmund.  
Minter, Leonard J.  
Noble, Stanley.

BOGNOR.—Rawlinson, Frederick J.

BRIXTON.—Elliott, George B.

BURNHAM. — Berry, Frederick  
Charles.

BUXTON.  
Armstrong, Wm.  
Bennet, R. O. Gifford.  
Bennet, Chas. J.  
Braithwaite, John.  
Lorimer, George.  
Parker, R. Derident.  
Thompson, G. H.

CAMBRIDGE.—Allbutt, Prof. Clif-  
ford (Hon.)

CAISTOR-ON-SEA.—Case, William.

CHELTENHAM.  
Cardew, G. A.  
Lawrence, H. Cripps.  
Pruen, Septimus Tristram.

CLACTON-ON-SEA.—Nourse, C. M.  
Stuart.

**CLIFTON.**

Clarke, J. Michell.  
Whitby, Chas.

**CROMER.**—Musgrave, C. B. Thos.

**CROWBOROUGH.**—Newell, Percy.

**DEAL.**—Lyddon, Richard.

**DEVONPORT.**—Hall, O.

**DOVER.**—Parsons, Charles.

**DROITWICH.**

Corbett, Thomas.  
Cuthbertson, J. M.  
Foulds, Francis Henry.  
Jones, H. Shirley.  
Roden, Percy A.  
Wilkinson, John.

**EASTBOURNE.**

Barnes, Robert.  
Daly, W. J.  
Frost, E.  
Habgood, Henry.  
Macqueen, Thomas.  
Plant, James Robert.

**EXETER.**—Kempe, A.

**FALMOUTH.**

Bullmore, W. King.  
Knuthsen, L. F. M.  
\*Young, Major L. Tarleton.

**FELIXSTOWE.**—Havell, C. G.

**FINCHLEY.**—Bangay, Richard.

**FOLKESTONE.**

Barrett, W. P.  
Dodd, Percy.  
Eastes, Thomas.  
Larking, Arthur E.  
Latter, Cecil.  
Lewis, Percy George.  
Tyson, W. J.  
Wainwright, Lennox.

**FRIMLEY GREEN (Surrey).**—Haviland, Alfred.

**GORLESTON.**—Gilmour, Graham  
Percy.

**GRANGE-OVER-SANDS.**

Beardsley, Amos.  
Beardsley, Richard Henry.  
Lowther, R.

**GREAT YARMOUTH.**—Moxon, A.  
H.

**HARROGATE.**

Bain, William.  
Black, J. Gordon.  
Gibson, Charles.  
Hind, Harry.  
Hobson, Lewis John.  
Mouillot, F. A.  
Myrtle, Andrew S.  
Myrtle, James A.  
Oliver, George.  
Ozanne, Frederick N.  
Smith, Francis W.  
Solly, Ernest.  
Walker, A. W. Hinsley.  
Watson, W. M. Crawford.  
Williams, Neville.

**HASLEMERE.**—Hutchinson, Roger  
Jackson.

**HASTINGS.**

Allford, H. G. L.  
Inglis, John.  
Watson, George Trustram.

**HERNE BAY.**—Bowes, Charles  
Keswick.

**HODDESDON.**—Love, William.

**HOGSTHORPE.**—Spilsbury, Francis  
James.

**HOYLAKE.**—McAulay, Matthew.

**HYTHE (Kent).**—Hackney, John.

**ILFORD.**—Houchin, E. K.

**ILFRACOMBE.**

Gardner, J. Twiname.  
Toller, C. W. E.

**ILKLEY.**

Bampton, A. H.  
Bates, W. R.  
Johnstone, Thomas.

**LEAMINGTON.**

Atkinson, Miles H. C.  
Eardley-Wilmot, R.  
Thursfield, Thos. W.  
Wellesley-Garrett, A. S.  
Wyer, Otho.

**LEICESTER.**—Pope, F. M.

LIMPLEY STOKE (Bath).—Drake,  
Thos. Geo.

LINCOLN.—Lowe, Geo. May.

LIVERPOOL. — Bickersteth, Ed-  
ward Robert (Hon.)

LONDON.

Abraham, Phineas S.

Achard, Alexander (Maryle-  
bone, W.)

Allen, W. Hamilton (Stanmore).

Ball, James Barry.

Baynes, Donald.

Bidwell, Leonard.

Blaker, Walter C.

Brown, F. Gordon.

Brown, George.

Bruce, J. Mitchell (Hon.)

Burnet, Robert William.

Campbell, Harry.

Cantlie, James.

Cathcart, George C.

Chaldecott, John Henry (Hamp-  
stead, N.W.)

Clarke, Ernest.

Clippingdale, S. D. (Kensing-  
ton).

Daniel, R. N. (S. Kensington).

Dockrell, Morgan.

Dodsworth, Frederick C. (Chis-  
wick).

Dowse, Thos. Stretch.

Ewart, William.

Fayrer, Sir Joseph, Bart. (Hon.)

Felkin, Robert William.

Forster, F. C.

Foster, Sir Walter (Hon.)

Fox, R. Fortescue (Winter).

Freyer, P. Johnston.

Gage-Brown, Charles Herbert  
(Belgravia, S.W.)

Garrod, Sir Alfred (Hon.)

Gordon, H. Laing (Honor Oak,  
S.E.)

Harbord, Augustus (Blooms-  
bury, W.C.)

Hawthorne, C. O.

Hedley, W. S.

Hill, G. W.

Hillyer, William H. (Streatham,  
S.W.)

Johnston, George F.

Jones, Montagu Handfield.

Keetley, C. R. B.

Kingscote, Ernest.

Knott, William (Oxford Circus,  
W.)

Lee, Robert (West Kensington).

Luff, Arthur Pearson.

Lyon, T. Glover (Victoria,  
S.W.)

Macfarlane, Alexander R. (Chel-  
sea, S.W.)

McCann, Frederick John.

McClure, Henry.

May, W. Page (May to Oct.)

Morison, Alexander.

Murray, J. Ivor.

Ord, W. Miller (Hon.)

Orwin, Arthur W.

Poore, Vivian (Hon.)

Pope, H. Campbell (Shepherd's  
Bush, W.)

Pope, Percy.

Powell, Sir Richard Douglas,  
Bart.

Pritchard, Owen.

Roberts, Francis H. (Forest  
Hill, S.E.)

Roberts, Frederick T.

Sansom, Arthur.

Scott, John Walter (Tulse Hill,  
S.W.)

Shaw-Mackenzie, J. A.

Sibley, W. Knowsley.

Sieveking, Sir Edward H.

Simpson, W. J. Ritchie.

Snape, Ernest (Marylebone, W.)

Spicer, Scanes.

Startin, James.

Stephenson, Sydney.

Stiell, Gavin (Clapham Com-  
mon, S.W.)

Stevens, B. H. Lyne.

Stocker, W. Woodley (Willes-  
den Green, N.W.)

Sunderland, Septimus.

Thomas, Arthur W. (Wands-  
worth Common, S.W.)

Thompson, E. Symes.

Thomson, St. Clair.

Thorne-Thorne, Leslie.

Thorne, W. Bezly.

- Tubby, A. H.  
 Underhill, T. H. (Herne Hill, S.E.)  
 Walker, H. Roe.  
 Walters, F. Rufenacht.  
 Ward-Humphreys, G. H.  
 Weber, Fred Parkes.  
 Weber, Hermann (Hon.)  
 White, Charles Percival.  
 Williams, Leonard.  
 Williams, Charles Theodore (Hon.)  
 Williams, Chisholm.  
 Woods, J. F.  
 Yeo, I. Burney (Hon.)  
 Younger, Edward George (Bloomsbury, W.C.)  
 LOUTH.—Gresswell, Albert.  
 LOWESTOFT.—Marshall, Augustine.  
 MABLETHORPE.—Iredale, J.  
 MALVERN.  
   Brockatt, Andrew A.  
   East, Charles Henry.  
   Fergusson, J. Campbell.  
   Haynes, Stanley.  
   Holbeche, Arthur Oliver.  
 MALVERN LINK.—Weir, Archibald Munday.  
 MANCHESTER.—Roberts, D. Lloyd (Hon.)  
 MARGATE.  
   Crook, H. Evelyn.  
   Hemming, J. J.  
   Thomson, Robert.  
   White, Edward Alexander.  
 MATLOCK.  
   Moxon, William.  
   Sharpe, William Cecil.  
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 NEWQUAY.—Hardwick, Arthur.  
 PAIGNTON.—Cosens, C. Hyde.  
 PARKSTONE.—Milner, Vincent.  
 PLYMOUTH.  
   Parsloe, Henry.  
   Pearse, William H.  
 POTTERS BAR.—Waddell, Arthur R.
- RAMSGATE.  
   Berry, John Bourne.  
   Tamplin, C. H.  
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 SCARBOROUGH.  
   Leigh, John Dickinson.  
   Snell, Sidney H.  
   Symes, Ernest.  
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 SEVENOAKS.—Wagstaffe, William Warwick.  
 SHERINGHAM.—Sumpter, W. J. Ernley.  
 SIDMOUTH.  
   Leon, George A.  
   Mackindoe, Alexander.  
 SILLOTH.—Crerar, Charles.  
 SOUTHEND-ON-SEA.—Wade, C. H.  
 SOUTHPORT.—Pinkerton, Chas.  
 SOUTHWOLD.—Herbert, Alf. Corbyn.  
 ST. IVES.—Nicholls, J. Michael.  
 ST. LEONARDS-ON-SEA.  
   Bagshawe, Frederic.  
   Batterham, John W.  
   Brown, A. Hardwick.  
   Inglis, Arthur Stephen.  
   Brisley, Chas. W.  
 ST. NEOTS.—Crosse, Edward J.  
 SURBITON (Surrey).  
   Merrick, Horace T. N.  
   Merrick, Robert Warren.  
 SWINDON.—Swinhoe, George Rodway.  
 TICEHURST.—Newington, H. Hayes.  
 TORQUAY.  
   Crowdy, F. D.  
   Cumming, G. W. Hamilton.  
   Eales, G. Y.

Odell, William.  
Pollard, Reginald.

TULSE HILL, S.W.—Scott, John  
Walter.

TUNBRIDGE WELLS.  
Bisshopp, F. R. B.  
Forbes, Norman H.  
Gilbert, E. G.  
Pardington, Geo. Lucas.  
Ranking, John E.  
Watson, Chas. Robert.  
Watson, Geo. S.

WESTGATE-ON-SEA. — Street,  
Alfred F.

WEST KIRBY.—Wilkinson, Percy  
J.

WESTON-SUPER-MARE.  
Martin, Ed. Fuller.  
Rossiter, George F.

WEYMOUTH.  
Browning, Benjamin.

WOODHALL SPA.  
Cuffe, Edward Meade.  
Cuffe, Robert.  
Williams, Cyril John.

WORTHING.—Simpson, W. S.

#### ISLE OF WIGHT.

CARISBROOKE.—Groves, Joseph.

SANDOWN.—Brodie, F. Cardew.

TOTLAND BAY.—Hands, Chas. H.

#### WALES.

ABERDOVEY. — Bonner, Thos.  
Irvine.

ABERYSTWITH. — Thomas, Abra-  
ham.

BURRY PORT.—Williams, Owen.

CAERGWILE.—Johnston, W. A.

LLANDRINDOD WELLS.  
Davies, W. Bowen.  
Evans, John Morgan.  
Greenway, Alfred G.  
\*Macfie, Ronald Campbell.

LLANGAMMARCH WELLS.  
Jones, Wm. Black.

PENMAENMAWR.—Williams, John  
Robert.

PORT TALBOT.—Davies, J. H.

#### SCOTLAND.

BRIDGE OF ALLAN.  
\*Fraser, John Hosack.  
Haldane, William.

CALLANDER.—McLaren, Hugh.

CRIEFF.—Thom, Alexander.

DUNKELD.—Taylor, James A.

EDINBURGH.

Affleck, Jas. O.  
Brown, J. Murdoch.  
Croom, J. Halliday.  
Grey, Harry (For letters in  
summer).  
James, Alex.  
Muirhead, Claude.  
Russell, Wm.  
Watson, D. Chalmers.

GLASGOW.—Alexander, John.

GOLSPIE.—Simpson, J. B.

MOFFAT.—Huskie, David.

NAIRN.

Cruikshank, Brodie.  
Sclanders, Alex.

OBAN.—McCalmen, Dove.

ROTHESAY.—Marshall, J. N.

STRATHPEFFER.

Bruce, William.  
Duncan, E. H.  
Fox, R. Fortescue (Summer).  
Fox, J. Tregelles.

ST. ANDREWS.—Huntington, Wm.

#### IRELAND.

BELFAST.—Byers, Prof. John W.  
(Hon.)

BUNDORAN.—Creighton, Robt. H.

DONEGAL.—Warnock, Hugh Thos.

DUBLIN.

Banks, Sir John (Hon.)

Little, James.

LISDOONVARNA.—Westropp, W.  
Stackpoole.

QUEENSTOWN.—Townsend, R. H.

ST. ANN'S HILL.—Bennett, Ar-  
thur Geo.

VALENCIA ISLAND.—Letters, Pa-  
trick.

#### ISLE OF MAN.

DOUGLAS.—Mackenzie, Thomas.

RAMSEY.—Tellett, Frederick.

#### CHANNEL ISLANDS.

ALDERNEY.—Livesay, Edgar Wm.

GUERNSEY.

Dunkley, Wm. Wilberforce.

Merrall, H.

#### FELLOWS RESIDING ABROAD.

AIKEN (S. Carolina).—McGahan,  
Chas. F.

AIX LES BAINS.

Forestier, Henri.

Rendall, Stanley Morton (In  
Summer).

ARMIDALE (N. S. Wales).—Little,  
Joseph Henry.

ASSOUAN (Egypt).—Canney, H.  
E. Leigh.

BADEN-BADEN (Germany).—Gil-  
bert, W. H.

BORDIGHERA (Italy).—Danvers,  
Herbert.

CAIRO (Egypt).—Sandwith, Flem-  
ming Mant.

CANNES.

Macdougall, J. Aymers.

Sanders, Gordon.

CAPE COLONY.—Guillemard, B. J.

CAPE TOWN.—Scholtz, Wm. C.

DURBAN (Natal).

Birtwell, Daniel.

Prince, J. Perrott.

GIBRALTAR.—Turner, William.

GERMANY.—Marcus, Tigismund  
Ph. (Summer).

HELOUAN (Egypt).—May, William  
Page (November to April).

LAUSANNE (Switzerland).—Harpe,  
Eugene de la (Corr.).

MADEIRA.—Krohn, Ronald Ed-  
ward Stewart.

MAGGIORE.—Grey, Harry (In  
Spring and Autumn).

MENTONE.

Rendall, Stanley Morton (In  
Winter).

Campbell, J. William.

MONTE CARLO.

Fagge, T. H.

Mitchell, R. Pryce.

Rouse, Rolla.

Sim, Roderick.

MONTREUX (Switzerland).—Wise,  
Alfred Thos. Tucker.

NAPLES (Italy).—Gairdner, Mat-  
thew Wm.

NEUENAU (Germany).—Grübe,  
Karl (Corr.).

NICE (France).

Amy, George.

Gilchrist, Alexander Wm.

ODTSHOORN (South Africa).—  
Russell, George.

SAN REMO (Italy).

Foster, Geo. Michael.

Grey, Harry (In Winter).

Marcus, Tigismund, Ph. (Win-  
ter).

ST. MORITZ (Switzerland).—Hol-  
land, James Frank.

VICTORIA (Australia).—Naylor,  
Rupert Geo.

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A COMPARISON OF THE CLIMATE OF ALGIERS  
WITH THAT OF THE RIVIERA.

BY E. SYMES THOMPSON, M.D., F.R.C.P.

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HAVING long desired to compare the climate of Algiers with that of the Riviera and Egypt, and to form an opinion as to the relative advantages of a winter spent on the south coast of England or of France with that of our more distant health resorts, I escaped in January last from professional ties and made a short tour in Algeria.

Thirty years ago a visit to Algiers was regarded as an adventure, and those who had been there were looked upon as great travellers—this is all changed, and “Paris over the sea” is now within easy reach.

Leaving London at 11 a.m. and Paris at 8 p.m., Marseilles is reached in twenty-two hours. The boats have a speed of 17 miles an hour and reach Algiers early the following afternoon. If the sea is calm the passage is pleasant and by 4 o'clock on the second day from leaving London you ought to be drinking tea on the terrace of your hotel at Mustapha

Supérieur, sheltered by palms and flowering aloes, with roses, heliotrope and fuchsia scenting the air, with bougainvillia and other brightly-coloured creepers draping the Pergola and the white walls.

The subtropical vegetation of Algiers in January is truly wonderful, the deep blue of the Mediterranean and the marvellous sunset hues charm the eye accustomed to the grey mists and fogs of London.

The wondrous vegetation suggests, and truly, that there must be moisture ; this is to a large extent supplied by heavy dews which fall on every green thing, and also on the marble pavements of the terrace, and on the window sills. The rainfall is also considerable (32 inches). It falls, however, on but a few (forty to fifty) days in the year. It is evident that the neighbouring ocean gives to the climate of Algiers itself a relaxing quality quite different from that of Biskra and the Desert inland.

As seen from the sea Algiers appears like a city of palaces occupying the western extremity of the Bay and having therefore an eastern aspect. The native quarter towers above the modern city, its square houses, tier above tier, look like dice piled on each other.

The hills of Mustapha Supérieur rise steeply to the west and north, thus giving shelter from the wind, and at the same time cutting off much of the evening sun.

The hotels and villas occupied by visitors and residents have for the most part an eastern and southern aspect and are shut in by palms and other trees, which give the shelter so necessary in summer, but which tend in winter to shorten unduly the hours of sunshine and to lessen that full exposure to the air so needful in a somewhat relaxing climate.

One of the hotels (Hotel Splendide) stands on the cap of the hill and is freely exposed to every breeze ; the Hotels St. George and Kirsch are more sheltered, and the Hotel Continental lies lower, though raised above the city. It has a southern as well as an eastern outlook.

Some of the houses at the top of Mustapha Supérieur and at El Biar stand at an elevation of 800 feet, and have a glorious

climate, in which some (chiefly residents) remain throughout the summer ; at midday the sun in summer is hot, but life is enjoyable.

Varying views regarding the climate may be explained by the fact that Algiers, being situated at the bottom and at the top of a range of hills, has two or three distinct climates, and, secondly, because the rain comes in torrents for a week or more, when the humidity is excessive, then periods of drought occur in which, but for the heavy dews, vegetation would suffer.

The contrast between day and night temperature is not great, but the fall of the thermometer at sundown is often 10° F. This fall, however, is not maintained, and an hour after sunset the difference may be only 5°.

The sensation of chill seems greater than the thermometer indicates. It would seem that the skin, under the stimulating influence of sunshine, becomes responsive and unduly sensitive to changes of environment. Chills caught owing to lack of wraps when driving at sundown are apt to prove tiresome and tedious, even to the healthy, and should be carefully avoided.

Unlike the Swiss altitudes, which tempt to exertion (and are specially fitted for those whose tissues are sound and whose habits are athletic), the air of Algiers renders the visitor quite content to loiter, to stroll, to drive or wander placidly among the flowers and the palms. He feels glad that he is tired and that he has earned and may enjoy a siesta. Algiers indeed is proverbially "good for sleeping, good for eating, good for loitering."

The ascent to Mustapha Supérieur is habitually made in the electric tramway, which mounts the hill quickly and easily, whilst the descent may be made on foot.

Those whose hearts are weak or whose lungs are emphysematous enjoy the walk to the town and the return to their hotel by carriage or tram, without the effort of walking up hill. In this respect Algiers is superior to other hill stations in such cases, as also in renal, hepatic, and cerebral degenerations, where the indication is to secure an open air life with adequate variety and incident, but without fatigue.

On the other hand the impression is general, and my own observation confirms this, that Algiers is not suitable for cases of chronic or acute rheumatism. This does not, however, apply to Hamman R'Irha and other Spas in Algeria, of which mention will be made presently.

Happily for Algeria there is no Monte Carlo, and the dissipations and gaieties of Nice and of Cairo are wanting, yet social interests are adequate and there is much to interest the traveller and the archæologist, and especially the botanist.

The vegetation of Algiers is one of its greatest attractions. The palms grow with amazing rapidity, and the Jardin de D'Essai, planted soon after the French occupation, with the object of testing the acclimatisation of various tropical and subtropical plants, has proved most interesting.

The planting of eucalyptus in waste places has had a salutary effect, stagnant pools are rare and mosquitoes are uncommon.

The general sanitation of the town has vastly improved. Flushing tanks have been arranged, and the sewerage is superior to that of most Continental cities.

Tubercular disease is rare among the Algerians, though frequent among the Arabs and Negroes. It is stated that among the European population in Algiers the deaths from consumption were one in forty, whilst the proportion of deaths caused by this disease in London and in Paris is about one in five.

Dr. W. Thomson, whose experience of Algiers has extended over thirty years, regards the climate as specially suited for cases of phthisis with an irritated bronchial, laryngeal, or pharyngeal membrane.

The quality of the air at Mustapha Supérieur, and still more at the summit of the hill, partakes of the bracing quality of mountain air, whereas in the town, near the harbour, it is distinctly relaxing.

In emphysema, asthma, and specially in cases of weak heart, whether functional or organic, the sedative quality of the air, which allays nervous irritability and encourages sleep, is of much value, especially in this the case in Bright's disease.

The influence of the neighbouring ocean on the climate of Algiers is unmistakable ; that of the Desert is also an important factor.

Thanks to the enterprise which has followed the French occupation, the Biskra oasis is now within reach. The journey by rail may be accomplished in twenty-two hours, but it is better to travel by day to El Guerrah and spend the night at a comfortable though primitive railway inn. The elevation (nearly 3,000 feet above the sea) makes the atmosphere cold, but with adequate precaution there should be no danger to the invalid.

Starting on the following morning at about nine, Biskra is reached at 4 p.m. The journey through the gorge of El Kantara, where an oasis of thousands of date palms bursts upon the eye, is unique. The train winds down the narrowing and deepening gorge, amongst the rocky heights of the Aures mountains; in a moment the defile ends and a new world bursts into view ; at one moment you are overshadowed by the frowning and barren mountains, the next among palms, oleanders and green fruit trees, and then in the blazing and endless desert. Following the almost dry river bed the railway wanders on until the Oasis of Biskra, a cultivated tract three miles in length, and from one-sixth to three-fourths of a mile in breadth, with its 170,000 palm trees, breaks in upon the pathless desert.

There are five Arab villages in the Biskra oasis containing a crowded population, and near to the casino and the hotels is a negro village, in which the descendants of the slaves brought by Algerian pirates live and multiply. Still nearer is a camel stable.

The great virtue of the climate, its purity, may easily be vitiated, a camel stable or a negro village may easily spoil the most perfect climate. Until this stable has been shifted (which should be done this summer) from its present position, the two best hotels are rendered unsuitable for invalids.

The air of the desert is not only pure, but it is dry, no trace of humidity being present, except in the immediate presence of irrigated gardens.

The atmosphere is so clear that the outline of the distant mountains makes them seem close at hand, and the colouring at sunrise and at sunset is at least as beautiful as at Luxor or Assouan.

The wind at Biskra, as at Assouan, is often trying, carrying with it eddying clouds of fine dust. The Nile minimises the evil of dust storms at Assouan, and during the time I was at Biskra, the sand, though clouding the margin of the desert, was hardly perceptible within the oasis.

The prevalence of wind, due to the proximity of the mountains, is the great drawback of the climate. The air is fresh, cool, and enjoyable. There is practically no rain and very little mist.

In the absence of an English physician it is not wise as yet to send to Biskra cases of serious illness needing skilled and watchful care. The French doctor is a competent man, but English invalids are not always happy under foreign medical guidance.

There are, however, every year an increasing number of winter visitors who are neither ordinary tourists nor exactly invalids, who, having no home ties, are able, like the swallows, to avoid the English winter and spend the season in the South. Many of these, tired of the Riviera, of Italy, or the Canary Islands, seek new interests, and for these Algeria affords a haven, and it is this class that has found at Algiers and Biskra what they desire.

The latest meteorological observations show a winter temperature never exceeding 80° F., and rarely falling below 60°. The climate is as mild as Madeira, but without its humidity and its enervating influence. The atmosphere is indeed as exhilarating as that of Helouan or Luxor.

The enterprise of the Algerian trans-Saharan railway has rendered Biskra accessible. It is but 140 miles from Constantine, whence Tunis is easily reached.

The long railway journey to or from Algiers may be avoided by taking boat from Marseilles to Bona or Phillipville, within a short distance of Constantine.

The oasis of Sidi Okba and Wallad, a native town full of

semi-savage and very filthy Arabs, should be avoided by invalids. It is interesting as containing in its Mosque the mortal remains of the Arab who gave his name to the Oasis. He was one of the greatest of the early adherents of the prophet, and, but for the obstacle of the Mediterranean, might perhaps have subjugated Europe as well as Northern Africa.

The military railway is to be pushed on to Touggouet, an important outpost and frontier town of nearly 5,000 inhabitants, 140 miles south of Biskra. When this railway is opened a more distant, though probably not more attractive, desert station will be open for exploitation.

As an evidence of the purity and dryness of the air, Dr. L. Kidd observes that "washing (whether of one's person or clothing) appears a wanton waste of time, trouble, and soap and water!"

The Mahommedan who, according to the decree of the Prophet, must always wash his hands and face before his morning, evening, and midday prayers, performs this function, in the customary absence of water, with sand. In the desert the purity of the sand is perfect, but in the midst of a native village the earth thus used is often too filthy for description.

The exquisite purity and softness of the sand is one of the charms of life in the desert. It is most enjoyable to stroll among the sand dunes, they have a similar charm to the solitudes of the glacier, or the snow mountains. The vegetation, though sparse, is unique. The "apples of Sodom," looking like luscious oranges, but bitter and poisonous, are found in great profusion at Biskra.

All around the Spa, four miles from the town, the desert extends to the rocky hills that close in the horizon, the sand is covered here and there with saline incrustation, and the crater of an extinct volcano, now a circular lake of salt water, tells of subterranean action of which the hot spring is a further evidence.

This desert, unlike that at Mena House, is free from the incursions and turmoil of begging children and noisy Arabs that make the vicinity of the Pyramids and of the Sphinx so trying to tourists.

The hot Sulphur Spring ("Saint's Bath") at Biskra, has long been used by the Arabs, but has only within the last three or four years been made available for Europeans.

The spring is of a high temperature, about  $115^{\circ}$  at its source. (The saline constituents are given in the accompanying table.) It is copiously charged with sulphuretted hydrogen. The volume of water is very large, greatly in excess of all possible requirements. To the taste it is soft and by no means unpleasant, having the chicken broth flavour reminding one of the Aix-la-Chapelle spring.

The baths are large, 7ft. by 10ft. and 3ft. deep. It is customary to let the water stand until it has cooled down to  $100^{\circ}$ , when the atmosphere of the lofty room is filled with vapour and sulphuretted hydrogen gas. The patient remains in the bath from three to thirty minutes and the temperature is gradually raised, by the introduction of fresh water, to  $110^{\circ}$ , or even higher. On leaving the bath friction or massage is applied and the patient lies in the cooling room or basks in the sunshine in the palm-surrounded enclosed court in the centre of which the spring bursts forth.

The combined effect of the water, the steam-laden air, and the sulphurous vapour upon the pharyngeal, laryngeal and bronchial membranes is great; affections of the Eustachian tube are also treated with success. The action on the skin is marked and the friction and massage doubtless increase the salutary influence by promoting elimination.

The waters have gained an extensive reputation for the relief of chronic syphilitic affections among the Arabs, who are great sufferers from the disease; this experience is the more valuable inasmuch as the Arabs, having a rooted objection to physic, trust to the unaided effect of the waters. Dr. Constant, of Biskra, has been much impressed by this fact, and seems to be doubtful whether the addition of mercurials, iodides, &c., really hastens the cure. Experience of Aix-la-Chapelle methods led him to trust to a combination of medicine and water, but experience of the more potent waters of Biskra has made him hesitate in many cases to use any further measures than are supplied by the Spa treatment.

The position of the spring in the midst of the desert, cut off from all human or other contaminating influence, makes life at the Spa very beneficial. The tram takes the bather to the Baths in twenty minutes. He may there spend several hours and return to his hotel, after a game of golf, to luncheon, afternoon tea, or dinner, as he pleases.

There are a few sleeping rooms at the establishment, but all drinking water has to be brought from Biskra, and life at the Spa is at present primitive. If a hotel like the "Mena Housa" were built at the Spa it would secure every advantage to be gained from desert life, together with the valuable influence of the hot sulphurous spring. The air is absolutely pure and healing. It is never cold, and there is practically no rain. The hygrometer varies from 30 to 50, average 40, whilst at Algiers it varies from 70 to 80. During gales the dust is trying.

This Table gives the composition of this spring. In temperature the water is like that of Aix-les-Bains and Aix-la-Chapelle; in composition it is like that of Uriage.

Analysis.				Grammes.
Sulphate of potassium	...	...	...	0'2219
Sulphate of sodium	...	...	...	1'0161
Chloride of sodium	...	...	...	6'2046
Bromide of sodium	...	...	...	0'0067
Chloride of lithium	...	...	...	0'0362
Sulphate of lime	...	...	...	0'7743
Sulphate of magnesia	...	...	...	0'0220
Carbonate of lime	...	...	...	0'3362
Chloride of magnesia	...	...	...	0'2255
Soluble silicate	...	...	...	0'0235
				Gr. 6'8670
Volatile principles.				
Ammonia...	...	...	...	0 gr. 0065
Nitrous acid	...	...	...	0 ,, 0006
Nitric acid	...	...	...	traces
Carbonic acid	...	...	...	0 gr. 1339
Free oxygen	...	...	...	0 ,, 75
Gas not observable by pyrogastric acid	...	...	...	15 ,, 75

The waters are diaphoretic, diuretic and resolvent. They promote biliary secretion, they are laxative in their action, and encourage mucous secretion from the larynx and bronchia, rendering expectoration easy, and tend to also relieve pulmonary stasis and hemoptysis.

Whilst of value in cases of irritable bronchia they are not to be commended in cases of phthisis.

For chronic catarrhal conditions of the respiratory passages in scrofulous, syphilitic and chronic rheumatic affections the waters are largely used.

In comparing Biskra with the Upper Nile, say Assouan or Luxor, one must remember that Biskra is less than 200 miles from the Mediterranean and 700 miles from the Atlantic. These marine influences are less at Assouan, which is, in a direct line, 600 miles from the Mediterranean and 200 miles from the Red Sea.

The climate of Tangier is generally equable and is very pleasant. In summer there is more saline humidity in the air, as might be expected from their relative positions, than at Algiers, which is 600 miles to the east, and less than in Madeira, 800 miles to the west.

For an artist the glories of tropical scenery and vegetation supply a never-ending field of interest. The botany of the desert is also unique.

A few years ago, before Helouan or Mena Housa were opened or the energy of Messrs. Cook & Co. had made Luxor and Assouan available, Egypt meant Cairo. The same might have been said of Algeria a few years ago, only the city of Algiers was available for invalids. The enterprise of the Railway Companies and Hotel proprietors has now opened up new Spas and health stations.

Of these Hammam R'lrha occupies a well-sheltered position 2,000 feet above and fifteen miles distant from the sea.

It is sixty miles from Algiers and can be reached in four or five hours from the capital.

Not only is the climate more exhilarating and less relaxing than that of Algiers, but it can boast of three mineral springs of distinct value. Two of these are hot, temperature  $113^{\circ}$  and  $99^{\circ}$ , and the third a cold chalybeate.

The following is an analysis of the hot springs, temperature  $113^{\circ}$  F.

Carbonate of lime ...	...	...	...	...	0'207
Carbonate of magnesia ...	...	...	...	...	0'030
Sulphate of lime ...	...	...	...	...	1.303
Sulphate of magnesia ...	...	...	...	...	0'172
Sulphate of soda ...	...	...	...	...	0'017
Chloride of sodium ...	...	...	...	...	0'439
Sodium of potassium ...	...	...	...	...	0'091
Silicate of soda ...	...	...	...	...	0'069
Alum ...	...	...	...	...	0'002
Peroxide iron ...	...	...	...	...	a trace
					<hr/>
					2'330

Like the waters of Bath the principle constituent is sulphate of lime.

The composition of the cold chalybeate is—

Unbound carbonic acid ...	...	...	...	...	0'8820
Bicarbonate of lime ...	...	...	...	...	0'9411
Bicarbonate of magnesia ...	...	...	...	...	0'0314
Bicarbonate of struthia ...	...	...	...	...	a trace
Bicarbonate of manganese ...	...	...	...	...	0'0008
Bicarbonate of iron ...	...	...	...	...	0'0100
Sulphate of lime ...	...	...	...	...	0'5338
Sulphate of magnesium ...	...	...	...	...	0'1623
Sulphate of sodium ...	...	...	...	...	0'3425
Chloride of sodium ...	...	...	...	...	0'2801
Chloride of potassium ...	...	...	...	...	a trace
Silicate of soda ...	...	...	...	...	0'0220
Alum ...	...	...	...	...	0'0028
Organic substances, arsenic and phosphoric acid ...	...	...	...	...	traces
					<hr/>
					3'2108

The temperature (Centigrade) of these hot springs is as follows :—

Hamam R'Irha ...	...	...	...	...	45°
Aix-la-Chapelle ...	...	...	...	...	57°
Carlsbad ...	...	...	...	...	75°
Hamam Meskoutine ...	...	...	...	...	96°

The quantity of water discharged in an hour is at—

Hamam R'Irha ...	...	...	...	...	4,200 litres
St. Sauveur ...	...	...	...	...	6,000 „
Baréges ...	...	...	...	...	7,500 „
Amélie-les-Bains ...	...	...	...	...	50,000 „
Hamam Meskoutine ...	...	...	...	...	200,000 „

sufficient for many thousand persons at one time.

The atmosphere is wonderfully equable and scarcely varies 10° between summer and winter, and Hamam R'Irha is appreciated as a summer health resort by the Algerians.

The air is bracing and stimulating, and has been compared to that of the Engadine, though it is of course much warmer. The atmosphere is fresh and pure, and in early stages of phthisis has proved beneficial. The waters are valuable in gouty and rheumatic affections.

The swimming baths are large and commodious, with every convenience for gouty and rheumatic persons disabled by contorted or powerless joints.

Hammam R'Irha has been brought to the notice of the profession in England by Sir Lauder Brunton and the late Sir Morell Mackenzie and Mr. George Pollock.

The hot spring (113° F.) is allied to that of Bath and of Baden (Austria).

In the Military hospital large numbers of wounded soldiers have been treated with success.

The Arabs have great faith in the waters, and the bath establishment is also completely arranged for the reception of European invalids.

At a time of year when Wiesbaden, Wildbad, Baden-Baden, Aix-les-Bains and Aix-la-Chapelle are necessarily deserted, Hammam R'Irha holds out prospects of relief as great as can be assured in those popular resorts.

It is usual to take the baths daily (ten to twelve minutes). The bath exercises a tonic effect.

The baths of Contrexéville and Vittel are similar in their action.

Muscular rheumatism and contraction of joints form a considerable proportion of the cases treated. It would seem that neuralgic affections are exceedingly common among the Algerians. A long sojourn in Algiers is said to "develop such affections, persons of a lymphatic temperament becoming nervous." Cases of genuine phthisis may do well, provided that they do not take the waters.

Hammam Meskoutine ("The Accursed Spring") is a truly remarkable place. In prehistoric times it must have been a veritable geyser, shooting forth its boiling waters to the height perhaps of 100 ft. Evidence of this is to be seen in the spire-like rocks formed by the deposition of carbonate of lime.

In the Roman period cone-like prominences, some 10 ft. or 15 ft. in height, were deposited in the same way. Now the boiling spring rises in a lake and deposits its saline constituents, on cooling, upon the rocks as it overflows into the valley, thus forming white marble terraces, similar to those of New Zealand, of exceeding beauty.

If there is any special virtue in water heated by subterranean means, this boiling spring must have exceptional powers. The baths, which are 6ft. by 10ft. and 4ft. deep, are brought down by the addition of cold water to a temperature of 100° F., and then raised to 105° or 110° by the addition of water from the boiling spring. There are three distinct springs, one a chalybeate, but that chiefly used is not highly mineralised. The steam and carbonic acid gas given off are of service in laryngeal and bronchial trouble and elimination is promoted by the diaphoretic action of the baths.

*Analysis of Chalybeate Springs.*

Carbonate of lime ...	...	...	...	...	0'1746
Carbonate of magnesia ...	...	...	...	...	0'0237
Sulphate of lime ...	...	...	...	...	0'4292
Sulphate of soda ...	...	...	...	...	0'0528
Chloride of potassium ...	...	...	...	...	0'0406
Chloride of magnesium ...	...	...	...	...	0'0708
Chloride of sodium ...	...	...	...	...	0'3504
Phosphate of soda...	...	...	...	...	0'0202
Oxide of iron ...	...	...	...	...	0'0500
Silicic acid ...	...	...	...	...	0'0125
Iodine ...	...	...	...	...	traces
Organic matter ...	...	...	...	...	0'0352
					<hr/>
					0'2640
					<hr/>
The gas given off consists of ...	...	...	...	...	97 parts
Carbonic acid ...	...	...	...	...	'5 „
Sulphuretted hydrogen and nitrogen ...	...	...	...	...	25 „
					<hr/>
					100 parts

The establishment is primitive and old-fashioned, consisting of large, tiled rooms, arranged in sets of four, with broad verandahs. The salon, separated from the bedrooms by one arcade and the Salle-a-manger by another, all in the midst of orange groves, cool, plashing fountains, and Roman pillars and sculpture. It is delightful, after taking a hot bath, to stroll among the citrons and oranges and to pick the tangerines and other fruits in absolute perfection.

The sportsman will find plenty of red-legged partridges and other game, and wild boar shooting is an occasional diversion. Fishing and riding give variety to a life otherwise devoid of incident.

The peaceful simplicity of this haven of rest, after the bustle of great hotels, is enjoyable to those desiring quiet.

As at Biskra, those seeking escape from publicity may here enjoy the advantages of Aix-la-Chapelle without the name. In peripheral neuritis, syphilitic and ataxic conditions these Spas have gained a well-deserved reputation. Neuralgic affections, associated with gout and rheumatism, also here find comfort.

The clear, dry, warm climate of the desert, free from rain, mist, snow and dust, with healthy surroundings and adequate occupation, is calculated to benefit a large number of invalids and convalescents.

The thermal waters, employed with judgment, tend to promote elimination in gouty and lithæmic conditions. They are certainly useful in pharyngeal and laryngeal catarrh and chronic bronchial affections. Dyspepsia, associated with plethora, is relieved, and stout people do well. As already stated renal cases are especially favoured.

Many forms of functional and early organic disease of the nervous system, rheumatoid arthritis, neurasthenia, asthma, &c., find in the desert a haven of rest and peace.

When compared with Helouan, although Biskra is somewhat further from the Mediterranean and its oceanic influences, it is nearly five degrees further north and therefore somewhat less hot.

It is also somewhat more windy, but the sand of the desert is in larger particles than the sand of cultivated fields and does not rise so readily, and if raised sinks much more quickly. The wind on the Nile is always from the north, at Biskra the winds are variable in direction and in strength. In both places the winds are stronger by day than by night. The photographs showing the tropical vegetation of Biskra and its neighbourhood are not, I believe, to be equalled by anything to be seen along the course of the Nile Valley.

All these Algerian springs, like those of Helouan, owe their value largely to the fact that they are, with summer-like surroundings, available during the winter months, when European spas are closed.

Beyond this, however, they have virtues of their own. Hammam Meskoutine, for instance, practically a boiling spring, gives off a large volume of steam, so that for purposes of inhalation it is of much value. Besides this the spring is situated in beautiful country without even a village to contaminate the air, free from all bustle and social diversion.

Hammam R'Irha (Aqua Calida) has the advantage of 2,000 feet elevation added to its general salubrity, whilst the Saints' Bath at Biskra has the advantage of being in the midst of the Sahara, yet within easy reach of the comforts of civilisation.

The two last-named spas, though less hot than that of Hammam Meskoutine, are quite hot enough.

I have come away impressed with the belief that the Hammam R'Irha is at least equal to the European baths of like composition, and that the Biskra waters are, as waters, really more potent and valuable than those of Aix-la-Chapelle.

In drawing a comparison between the Algerian and other climates I have been able to compare the opinions of various writers with my own observations made at different times during two visits to Egypt and two to Madeira, and many experiences of the French and Italian Riviera, Rome, Naples, Corsica, &c. I hope that I have thus qualified myself in some measure to consider some of these difficult questions.

Seasons, of course, vary greatly, and impressions made during unfavourable seasons tend to neutralise the good opinion of others, and *vice versa*, still on the whole a fairly just estimate may be formed by comparing the theoretical characteristics of a climate with meteorological records and personal observations. Besides this the experience gained by and through our patients cannot fail also to help us.

In such a summary as this, however, it is not possible, nor would it be desirable, to attempt to illustrate by cases the influence of climate.

THE PRESIDENT said few of the members had had oppor-

tunities of travel which would compare with those of Dr. Symes Thompson, and he (Dr. Bagshawe) would say at once that the only part he could contrast with Algiers in regard to climate was the Riviera. Many would remember Dr. Henry Bennett's book on the southern shores of the Mediterranean, and a large part of that work was devoted to the narration of an expedition which he made to Algiers, which led him to form an unfavourable view of the latter place compared with the south of Europe, partly because of its lack of protection from north winds and its great exposure to those from the south. Dr. Symes Thompson seemed to have formed a more favourable view of Algiers than did Dr. Bennett, but no doubt matters had very much improved there since Henry Bennett's time. Probably also the buildings had been extended into the more sheltered parts—Dr. Bennett specially condemned the portions of Mustapha which faced north. At the present day there were the advantages of electric trams and other modes of conveyance which were unknown to Dr. Bennett thirty years ago. Dr. Symes Thompson had given the Society a very attractive picture of Algiers as it is now, but he thought the Society owed Dr. Thompson a still greater debt of gratitude for his interesting account of the various spas at Biskra and Hammon-Meskoutine. They seemed to present not only features of great interest but contained mineral waters, which he would not say were unique, but which surpassed those of many much-frequented health resorts.

Dr. FORTESCUE FOX, in response to the President's invitation, said he came in the guise of a learner, and he hoped he had derived some instruction from the most interesting account they had heard. To him, and he thought also to many of the Fellows of the Society, Algiers was rather a *terra incognita*. Even in books which had hitherto been published descriptive of health resorts a great blank was observable in regard to that part of the world. They had not penetrated far into those resorts, which, as they had just been reminded, had been known since the days of the Romans, and which, in respect to the chemical constitution of the waters, temperature, and winter climatic conditions, were almost

unique. Therefore he thought they must all welcome the exceedingly valuable contribution from Dr. Symes Thompson, than whom there was no one more qualified to bring the subject to their notice. He was sure it would prompt many of them to study the question afresh, and those who had the opportunity would probably wish to see for themselves the region described. He had always felt that in winter time there was a great want in the matter of spas. One could not send people during the winter to the spas frequented during the summer. Helouan had lately come into prominence and proved very valuable in certain classes of cases; but every case did not do well in Egypt. He could not help thinking that perhaps in some of the less known Italian spas they might have, in the future, valuable winter resorts for those to whom baths and waters were necessary. He thought he spoke for others also when he said how much profit he had derived from the paper.

Dr. DOUGLAS KERR said he wished to add a word of thanks to Dr. Symes Thompson for his most interesting paper on a region so little known. While suffering from bad health in the year 1879, he visited Algiers, and Dr. Symes Thompson's paper showed him how striking had been the advance that had been made in the place as a health resort. His recollection of it was a magnificent bay, a French population, a comparatively small town, and very little accommodation for visitors. Dr. Thompson had pointed out a fact of very great advantage to practitioners in this country, namely, the sulphur springs, comparatively near home, in which, in winter, syphilitic patients might derive benefit, with or without mercurial treatment. He had visited Aachen in both summer and winter, and could say that the advantages to be derived from the mercurial treatment there at such times were slight compared with those in the spring and autumn, when the free action of the skin promoted the absorption and elimination of the mercurial inunction. Dr. Symes Thompson had also pointed out a fact which must appeal to many Englishman—the comparative secrecy with which the treatment could be carried out at other spas than Aachen. It

became almost a reproach at the present day to be known to visit Aachen : friends asked how one got to it and how long one had to stay ? By staying at other places less known, with the same benefits, that sort of thing was avoided.

Dr. PARKES WEBER asked whether the baths just described by Dr. Symes Thompson were administered by the French, or whether native people were employed in them ? Also, were doctors appointed to preside over the different washing places, as in France ? Was the administration carried out in the scientific manner seen in France, or was it left more or less to native enterprise ?

Dr. MAHOMED said he would like to hear more from Dr. Symes Thompson as to the nature of the shelter at Biskra. He was not clear as to the relative protection on the different sides.

Dr. SYMES THOMPSON, in replying on the discussion, said it must be admitted that though Dr. Henry Bennett, in the very charming book of the "Police Magistrate Knox," published twenty years ago, described Algiers as the new playground for English people and spoke of it with the greatest possible laudation as regards climate, he yet spoke with very strong criticism of the poor comforts available at that time. There had been a very marked change since then, however, as the pictures he had shown indicated. The comforts in the hotels were now very much greater than formerly. Another point alluded to by the President, and also referred to by Dr. Parkes Weber, was the condition of the wind—a matter of very great importance. Everyone recognised the value of the shelter of the Maritime Alps to the Riviera, which was so great that, but for those Alps, the Riviera would not have anything like its present value. The northern and easterly winds were cut off. In Algiers there was no such shelter ; the place was open to both the east and the north. Still, the winds from these directions, by their passage over the several hundreds of miles of Mediterranean, ceased to be so dangerous or inconvenient in Algiers as they were in Southern Europe. He did not pose as an advocate of Algiers at the expense of other health resorts ; his only object had been to get at

the truth and place so much of it as he could learn before his professional brethren. Those who lived at the top of El Bea, 800 feet in height, admitted that they experienced strong winds, but they were not described as either cruel or distressing. They caused the palms to bend before them as though they would break. He agreed that in Algiers more northerly and easterly winds were experienced than in the Riviera. With regard to Biskra, he thought the desert at Helouan was superior to that at Biskra, as the wind was less at Helouan. The latter was situated on the eastern bank of the Nile, and there was somewhat higher ground to the east, constituting a shelter in that direction. There was also a greater variation in the direction of the wind at Biskra than at Helouan. At Biskra the hills rose to the north and east, and afforded considerable shelter, but the general opinion was that the existence of those mountains was the cause of those winds, and that as they blew more in the day than at night, they depended a good deal on the heating of the surface of the mountains compared with that of the valleys.

Professor Drummond had shown that the extreme minuteness of the particles of alluvial dust was due to the ant, and when that dust was disturbed it remained suspended in the air for a considerable time. The sand of the desert, however, consisted of particles of rock of appreciable size ; therefore the sand was not so easily raised by wind, and when disturbed it soon fell again and was not an irritant to the air passages. He exhibited some sand from the desert to illustrate that point. He had frequently noticed from his terrace at Algiers that wind causing alluvial dust was not sufficient to disturb the sand.

With regard to the observations of Dr. Fortesque Fox and Dr. Douglas Kerr with reference to Aix-la-Chapelle, he believed it would be a great advantage to the profession to recognise that they had spas available for winter, and the facilities which now existed for getting about the world brought those to notice. When he was in South Africa he was impressed with the value of the Kalydon baths during the winter. He recommended a gentleman to go there, and his

answer was, "I have been to Kalydon and you have not. You would commit suicide if you were there three days." The miserable dullness made it a very disagreeable place to go to. But Kalydon had improved since then, and he knew a very fashionable lady who was there at the present time. When he was at Helouan five years ago its attractions were scarcely equal to those of Biskra to-day, but the elaborate comforts at the Helouan hotels exceeded at the present time those at Biskra ; but at the latter place he thought they would speedily improve.

With regard to the doctors at Algiers, it was the fact that an English doctor could not practise at Algiers without a French qualification, beyond seeing people in his hotel. At Biskra there was not yet an English doctor, and that was a want much felt by hotel-keepers, because they could not persuade people to stay. If an English doctor were to establish himself there, he (Dr. Thompson) thought there would be a considerable demand for his skill. If he were there for some seasons it would be necessary to procure a French qualification. A stay at Biskra, as at Aix-la-Chapelle, was likely to be of very great value in chronic syphilitic cases. When he was at Aix-la-Chapelle with a patient, in 1859, he was much impressed by the dryness of the atmosphere. Baths were taken and the waters imbibed in considerable quantities, but little urine was passed, and there was no perspiration. Where, then, did the water go ? The only explanation was that the water was given off in insensible transpiration. So it was in the desert, and he believed a very dry and warm atmosphere was an enormous addition to the virtues of those springs in chronic cases.

## POLYPHARMACY IN NATURE AND ART.

BY GEORGE MAHOMED, M.R.C.S., L.S.A. (BOURNEMOUTH).

THERE are no doubt many members of this Society who are thoroughly acquainted with the *rationale* of their own and other spas, but I take it that in a young Society like ours there must be others as ignorant as myself, and therefore I venture to discuss matters which some may think already sufficiently evident.

In commencing the rational study of balneology we should apply to it the methods which guide us in general therapeutics, such as frequent reports, collective investigations, physiologica experiments, &c., and then by reasoning endeavour to establish the value of waters, climates and methods. As soon, however, as we start on such a course we should be struck by the number of elements that enter into most mineral waters, and perhaps be discouraged ; for most of us have been taught that polypharmacy is unscientific.

With a view to clearing the ground for further enquiries, I shall attempt to-night to vindicate a method derided by some, practised by the many, and understood, perhaps, by the few ; and then we may perhaps see a parallel between the polypharmacy of art and of nature.

I believe that many of the leaders of our profession generally use only one drug at a time, and I was certainly warned against double barrelled shot gun prescriptions, &c., on the ground of their being chiefly covers for ignorance. There is no doubt the precept instilled was a good one, especially for beginners, the idea being to learn the comparative values of drugs by exhibiting them singly. This method may always be pursued advantageously in hospital practice, where there are facilities for carrying it out ; and time and competition do not press the enquirer. For such a study it would be first necessary to take a given bulk of the drugs to be experimented with, secondly to extract by the best methods the active principles, and thirdly, to exhibit them

until certain evidences of their effect could be demonstrated. Their respective values could then be established. If, for instance, we took a gramme each of digitalis leaves, of squill corms, and of strophanthus seeds, handed them to the pharmacist, and directed him to extract the active parts and make them up to solutions of one ounce, we might then give them to identical cases and measure the effect by sphygmograph or urinometer, until we could say that bulk for bulk *a*, *b*, *c*, were as 7, 5, and 4, so far as action in slowing the heart was concerned; or as 4, 6, and 3 so far as total diuretic action was sought. As things are, goodness knows how we arrive at an estimate of the efficacy of various drugs. But such estimates most of us have, and it is based on such estimates that drugs are combined in prescriptions. Indeed, I think if I was shown a prescription I had used in a case of bronchitis I could say whether it was for an old or a young patient by the combination of the drugs used, without looking at the dosage. If drugs are habitually combined on a plan like this there must be a reason for it, and it is into this that I now propose to enquire.

Most drugs act on different parts of the machinery at the same time. If you push a drug to obtain its effect on the kidneys you may obtain in addition a very unwelcome effect on the heart, whereas if you combined it, as it is often possible to do, with a drug that has an opposite cardiac effect, you might get free diuresis and no effect on the heart. This is the explanation of what may be called justifiable polypharmacy.

To make this at all clear I will take a group of drugs that have a certain reputation as expectorants. Most of them have as well an effect upon the heart, some have diuretic properties and some act also on the nervous system. I will express their actions in these various directions, according to my intuition, by assigning them numerical values, the combined action of each drug being a 100. Taking, for instance, nitrate of potash, I reckon its chief characteristic is as a diuretic, I set that down as 55; it is slightly diaphoretic, say 15; less of an expectorant, say 10; considerable as a cardiac depressant, say 20—the whole = 100.

In the first table I hand round I have summarised a group of similar drugs.

Drug	Expectorant	Dia-phoretic	Diu-retic	CARDIAC ACTION		ACTION ON NERVOUS SYSTEM		Anti-septic to Excretions	Total
				Pressor +	Depressor —	Stim. +	Sedative —		
Pot. Nit. ...	10	15	55	...	20	...	...	...	100
Pot. Acet. ...	10	60	20	...	10	...	...	...	100
Squills ...	40	...	30	30	...	...	...	...	100
Senega ...	30	20	20	...	15	...	15	...	100
Cubeb ...	40	...	40	...	...	...	...	20	100
Ipecacuanha ...	50	10	...	...	30	...	10	...	100
Antimony ...	60	...	...	...	40	...	...	...	100
Ether ...	30	...	20	40	...	10	...	...	100
Acet. of Ammon.	20	20	40	20	...	...	...	...	100
Carb. of Ammon.	30	10	...	40	...	20	...	...	100
Camphor ...	10	10	...	30 in small doses	30 in large doses	40 in small doses	40 in large doses	10	100
Ammoniacum ...	50	...	...	10	...	20	...	...	80
Bals. of Tolu ...	30	...	20	...	...	...	...	30	80
Tar ...	30	...	...	10	...	10	...	50	100

I propose now to take a few typical cases of lung trouble and to illustrate by means of the table the reasons for combining drugs.

(1) Let us take first the case of a child aged 7, suffering from broncho-pneumonia. The first stage is one of infiltration and inflammation, the drugs *par excellence* for this are antimony and ipecacuanha. I should prefer to use the first for twelve hours, then the second for twelve hours, and then on the second or third day to add ether. A young child's heart is like a green stick, you can depress it, but you can hardly break it—it flies back again. People, however, would generally mistrust so many changes in the treatment, so we will exhibit the antimony and ipecacuanha, together with some syrup of tolu and afterwards add the ether.

The effect of the combination will be represented by extracting the drugs from the table given on preceding page.

	Expecto- rant	Diaphor.	Diuretic	CARDIAC		NERVOUS		Excre- tory An- tiseptic
				+ Pres	- Depr.	+ Stim.	- Sedat.	
Antimony ...	60	...	...	...	40	...	...	...
Ipecacuanha	50	10	...	...	30	...	10	...
Tolu ...	30	...	20	...	...	...	...	30
Ether ...	30	...	20	40	...	10	...	...
	170	10	40	+ 40	- 70	+ 10	- 10	30

Reading the prescription by the light of these hypothetical values it will appear that we get great expectorant action, some diuretic action, at first a considerable cardiac depressant action, which is afterwards in part neutralised. The action on the nervous system also balances, and we obtain the action of an excretory antiseptic which we do not require, but the drug was chiefly used for its taste.

(2) Let us take as another illustrative case, the same illness in a person over 50 years of age, who also suffers from some mitral insufficiency. The inflammation is less acute, but other organs become congested. On account of his age and more especially of his mitral trouble it would be dangerous to depress the heart, therefore neither of the drugs used in the previous case would be admissible (except the ether). There is also the congestion of distant organs to be thought of. Acetate of ammonia occurs to one as a drug that will relieve three excretory organs at once. Acetate of potash, although slightly depressant, can be compensated by giving a cardiac tonic, as squills. For the adequate treatment of such a case digitalis and a saline aperient would probably be given as well, but it is better just now to limit ourselves to the drugs in the table. Extracting them thus it becomes evident that

	Expecto- rant	Diaph.	Diuretic	CARDIAC		NERVOUS		Antisep. to Ex- cretions
				+ Pres.	- Depres.	+ Stim.	- Sedat.	
Acet. of Am. ...	20	20	40	20	...	...	...	...
Squills ...	40	...	30	30	...	...	...	...
Acet. of Potash..	10	60	20	...	10	...	..	...
	70	80	90	+ 50	- 10	( = + 40 )		

the combination gives a strong excretory action, and a moderate tonic action on the heart. Not such a strong expectorant action as in the former prescription (it is hardly needed), but you have more action in other excretory organs.

There are, I believe, many medical men who, even if they admitted the therapeutic equivalents suggested by me would condemn such treatment as unscientific, but it seems to me that with a fair knowledge of the *rationale* it is as legitimate as to use a saw, a jack-plane, and a box-plane to reduce and polish a piece of rough wood. Doubtless the same ultimate effect could be obtained by working away from first to last with a jack-plane, but no carpenter would do it. I claim that by combining drugs in ordinary doses we may get the sum of their action in one direction with beneficial or negative effects in other directions, whereas if one drug only was used in double or treble the ordinary dose the poisonous symptoms of that drug would probably be evoked.

I now propose to look at the other side of the case. *When is polypharmacy unjustifiable?*

(1) Whenever as good a result could be obtained by the use of a single drug.

(2) When two drugs are used whose chief actions are antagonistic and their common property is not the sole object of the prescription.

(3) When drugs are used whose actions are only known to us empirically.

(4) When we use two or more drugs from infirmity of mind.

To expound the above rules a little, I would instance with regard to rule

(1) A simple case of anæmia can be cured by iron and a purgative. There is no need to add arsenic, or manganates, &c.

(2) Opium and belladonna are antagonistic in their effect on the skin, on the circulation, and on the respiratory centre, but their action on the visceral nervous centres is similar. Hence it would be improper to use them together in a case

of skin disease or heart disease (unless purely nervous), but they might be legitimately combined to allay spasm, as in increased peristalsis. On the other hand it seems indefensible to unite digitalis and nitroglycerine in one prescription for heart disease, as they are so antagonistic that one must undo the good effected by the other. For all that a firm of chemists has just introduced it as "one of our new combinations."

(3) As far as I am aware there are no particular reasons why some cases of trigeminal neuralgia are cured by quinine, others by phosphorus, others by butyl-chloral and yet others by gelseminum. They are given empirically ; we do not know how they do their spiriting. For this reason I never order any of these drugs together, for I hope to learn their individual potentialities by studying their action separately. But if anæmia or malaria could be established in a case of neuralgia it would be permissible to give iron or arsenic with either of them.

(4) Polypharmacy is dependent on our subjectivity for its legitimacy. If we have a clear idea of what the various drugs are going to do, it is right. If we have not it is wrong. If we cannot decide whether an ailment is due to rheumatism or disease of bone and we give a mixture of remedies suitable to both conditions it is horrible.

Having, I trust, to a certain extent shown that polypharmacy is in many cases a justifiable method, I beg to draw attention to its prevalence in mineral waters and some vegetable drugs. In several of the most popular springs at least six different elements are found, and these are often united to various acids ; thus at Kissingen and at Kreuznach you have chlorides of sodium, potassium and lime, magnesium, lithium, manganese, some of them existing as bicarbonates as well. At Marienbad and Vichy they exist as carbonates, with some as sulphates, and in the Hungarian waters chiefly as sulphates, with some as carbonates.

It will be observed of these common constituents that soda and potash, while generally similar in therapeutic effects, are opposite so far as their action on the heart and musculature of the intestine are concerned ; soda increases the force of the

cardiac contraction, and potash paralyses it, stopping the heart in diastole. The antagonism of these alkalies has been dwelt on by Sydney Ringer in his hand-book, and by Brunton. Again, the action of lime and magnesium salts on the intestine appear to be almost directly antagonistic. Magnesium produces watery stools and lime is an astringent. Whether a mineral water acts any better for having partly opposed constituents I do not know, but it seems to me we should bear the possibility in mind and go on observing; as Tardieu, whom I have quoted elsewhere, remarks: "A thermal water is an entity, a mixture of chemicals and dynamics—very hard to understand."

It is interesting to note in connection with the constituents of favourite mineral waters that soda, lime and magnesia, are the chief and invariable metals found; while potash, iron and alumina, mangan. and lithia, are not always present, and then only in much smaller quantities. Now as far as I am aware the superior solvency of potash salts to soda in uric acid conditions has only been known within the last fifty years, yet every spring which has a considerable quantity of potash salts has had a reputation for gout for generations. I would mention particularly Carlsbad, Ems, Royat, Selters (the strongest potash water there is), Vichy and Wiesbaden. I have an extract of these.

#### PROPORTION OF POTASH SALTS IN VARIOUS SPRINGS.<sup>1</sup>

*Aix-la-Chapelle.*—P. Half the quantity of sulphate of soda, NaCl 202, NaSO<sub>4</sub> 21, KSO<sub>4</sub> 11.

*Bonifacinos in Hesse-Nassau.*—Strongest lithia spring; has also 11 grs. of KSO<sub>4</sub> per gallon (more than the soda sulphate), chief constituents, NaCl 716, CaSO<sub>4</sub> 109.

*Bourboule.*—Chloride of potash 11 grs. per gallon. It has nearly 200 grs. of chloride of sod. and a little over that quantity of bicarbonate of soda.

*Carlsbad.*—The Schlossbrunnen has 115 grs. of KSO<sub>4</sub>

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<sup>1</sup> Quantities extracted from Ingram and Royle's list.

which is its chief constituent, the Sprudel only has 3 grs. against 200  $\text{NaSO}_4$ .

*Ems.*—Not so heavily mineralised, has 3 grs. of  $\text{KSO}_4$  (more than the  $\text{NaSO}_6$ ) it has, however, 150 grs. of bicarbonate of soda.

*Harrogate (Old S. well).*—Has 64 grs. of  $\text{KCl}$  against  $\text{NaCl}$  860.

*Kissingen.*—Has  $\text{KCl}$  20 grs. against 400  $\text{NaCl}$ . It has also 40 grs. of chloride of manganese.

*Royat.*—Bicarbonate of potash 13 to 20 grs. against 50 to 60 of soda and 60 to 70 of lime.

*Selters (in Nassau).*—Has 163 grs. of  $\text{KSO}_4$ , which is the chief constituent.

*Bath.*—Six grs. of  $\text{KSO}_4$  against 23 of  $\text{NaSO}_4$ .

*Vichy.*—Twenty-four grs. of bicarbonate of potash against 350 of soda.

*Wiesbaden.*—Eleven grs. chloride of potash against 524 of soda.

If you will indulge me a few moments I should like to turn to some of the vegetable drugs, which also contain principles apparently directly opposite, such as opium, digitalis, ergot, quinine, and calabar bean.

Opium contains seventeen or eighteen alkaloids. Some of these are convulsants, some emetic, some anodyne, and some soporific. Undoubtedly the best soporific effects can be generally obtained by morphine, but there are some actions, particularly on circulatory conditions, in which opium is preferable. Dr. Square, of Plymouth, recommended tr. of opium in bad cases of chilblain, and I have several times used it with advantage. I was also taught that opium had a favourable action in senile gangrene. And I have certainly seen cases in which morphine gave delirium and no sleep, where a dose of opium, either in pill or as liquid extract, gave a sound sleep and general improvement.

The alkaloids of bark do not appear to be antagonistic. The Madras Cinchona Commission reported that the four alkaloids were all febrifuge, and Garrod has proved that all cure ague. It may be, however, that they act better in

presence of each other, and I believe that cincho-tannic acid is a tonic in itself. Some form of tannic acid occurs in most astringent drugs, in tea, coffee and wine. At any rate when a tonic is required as distinguished from an antiperiodic or antipyretic, most practitioners prefer to give a liquid extract of bark containing all the alkaloids, acids and extractives.

In the case of digitalis, again, there are several alkaloids or principles which appear to be antagonistic when given separately. For instance Brunton says digitonin, which is similar to saponin, directly antagonises digitoxin, digitalin and digitalein. It is probable that the infusion of digitalis which contains relatively more digitonin (the saponin-like principle), is preferred by Balfour and other Scotch physicians because of its containing more of this principle, which is diuretic.

Ergot contains several principles which are separately antagonistic. Thus ergotinic acid paralyses spinal cord, causes a fall of blood pressure, causes no uterine contraction, while splanchnic acid and cornutine contract heart and blood vessels, cause a rise of blood pressure, and cause spastic rigidity of muscles. Calabar bean has also principles which, given separately, produce opposite results on the pupil.

I think the instances I have given are enough to show that it is not always the right and scientific thing to give the alkaloids or principles which can be separated from vegetable products, but that it is often better to give the crude drug with all its constituents in. There is evidently something in the chemistry of nature which we cannot follow. It is also a trite observation that the artificial copies of mineral waters have nothing like the qualities of their models. How far all or any of these examples are due to the fact that many natural medicaments contain several medicinally opposite elements I do not pretend to say. I only note that they do, and also that we may, with the reservation stated, follow such a course without outraging any natural or scientific law.

Dr. SYMES THOMPSON said he thought the table circulated by Dr. Mahomed helped them to understand the aim which the author had in view in bringing the matter before the

society. By such an analysis one could arrange in one's mind matters which otherwise would be vague and ill-defined, and every effort should be made to reclaim from the indefinite into the definite all the facts available. The last sentence of the paper focussed much that preceded it, and secured the assent of all. He supposed they had learnt to use the alkaloids instead of the crude drugs, as a consequence of the activity of the pharmacist, somewhat more than they should do. Old-fashioned doctors recognised the crude drug values, and the modern doctors had been disappointed in the use of the new products. He thought it better to use bark or opium instead of quinine or morphia. He was old-fashioned enough to recognise the value of combining drugs, while he admitted that in so doing one lost the definiteness striven after. In teaching students of course they were encouraged to think clearly and to give definitely one, or at most two, drugs at a time, otherwise they would fail to gain experience. But during practice one learnt that by combinations advantages were gained, and he thought Dr. Mahomed's reference to different kinds of plane for making an article very apt. There was a tendency to be very fond of using certain drugs, and sometimes to the exclusion of others, whereas if knowledge were more extensive and observation more accurate, they would descriminate in the use of drugs more than was the case now. The dentist carefully chose the instruments to use on a particular tooth, and doctors should do the same with regard to drug.

Dr. GILBERT (Tunbridge Wells) said he would be glad to hear how Dr. Mahomed arrived at a measure of the effects of the drugs he mentioned. According to the table, acetate of potash had a greater diaphoretic action than acetate of ammonia, but its diuretic action was less; but that was contrary to what one would expect, *a priori*. Carbonate of ammonia was said by Dr. Mahomed to be much less diaphoretic than acetate of ammonia, and yet he thought it was held that acetates and alkalies became carbonates in the blood. Why should the carbonate of ammonia have an action different from that of the acetate? A means of accurately estimating

the effect of different drugs would be very useful to practitioners in general. He himself had been disappointed in his efforts to find out what the effect was, such as in the case of expectorants.

The PRESIDENT said Dr. Gilbert's statement of his own experience showed the contention to be true that different men formed various estimates of the action, or degree of action, of a particular drug. He took it that Dr. Mahomed did not profess to go on any definite basis of experiment, but simply formed a personal estimate of the value of the drugs included in the tables. Probably the estimate of half a dozen other men would give half a dozen other values. Still, he thought Dr. Mahomed was on the right tack, and was simply putting into figures that which each practitioner did for himself in his own mind. Dr. Mahomed had ably shown how skilful combinations were useful, and the success of a practitioner virtually depended upon the skill with which he estimated the value of and used various drugs. The text-books did not contain such tables as Dr. Mahomed had submitted, but simply referred to the specific action of drugs on broad lines.

Dr. SOLLY (Harrogate) said it occurred to him while looking at Dr. Mahomed's tables that some of the arguments used were similar to those advanced in favour of scientific education at schools. Various studies were useful in the way of mental discipline, though they might not be of direct practical advantage. His own opinion of the effect of certain of the drugs mentioned would differ from that of Dr. Mahomed, but the habit of viewing drugs in that numerical light was one of considerable value, provided an open mind were preserved on the matter, allowing opinion to be modified as a result of observation. They would all admit that unrecognisable differences existed in different patients, and the same drug in a particular dose did not produce an equal effect on all, nor even on the same patient at all times. The human body was so complex that practitioners could not be dogmatic in the matter. Sometimes a given case was helpful in providing a sort of standard by which results could be judged from time to time.

The only practical observation he would make would be on the question of the Harrogate waters. They were accustomed to consider that one of the strongest Harrogate waters was beneficial, not because of any one constituent, but because of the combination of substances. Probably it was so with all waters. It was their experience at Harrogate that a patient could be purged freely, sometimes for two or three weeks, in sulphur water, which was not particularly strong in sulphur, and apparently without the slightest depression. That had been attributed to the presence in that particular water of a small quantity of barium chloride, which was supposed to be a heart tonic. He wondered whether a combination of aperient salt with something which kept up the blood pressure might not be useful. At many continental spas the patient was expected to go to some bracing place after the course of purgative waters, but at Harrogate they certainly found that was unnecessary, and the reason he had endeavoured to indicate.

Dr. MAHOMED, in replying on the discussion, said he stated on the tables distributed that they were only to be regarded in the light of a mental exercise. In the large books on therapeutics there was extreme vagueness on that point; they gave no quantitative indication of their effect, but only stated they were expectorants, or diuretics, and so on. He thought it would be interesting to put down what drugs were better than others for certain purposes and to what extent.

Dr. Gilbert wondered that he had found acetate of potash more useful as a diaphoretic than acetate of ammonia. Evidently Dr. Gilbert thought that because ammonia was volatile it was more likely to be a diaphoretic. He had constantly used acetate of potash, particularly in chronic Bright's disease, and his experience was that if such a patient were given 15 grs. of acetate of potash, he would sweat after two or three days. Except pilocarpine administered hypodermically, he had found no other drug so certain to produce sweating.

# BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL SOCIETY.

FRIDAY, MAY 31.

## HEPATIC INADEQUACY AND ITS RELATION TO IRREGULAR GOUT.

BY I. BURNEY YEO, M.D., F.R.C.P.

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MR. PRESIDENT AND GENTLEMEN,—When your excellent Honorary Secretary, Dr. Sunderland, conveyed to me your complimentary invitation to address you this evening, I hesitated as to whether I could find any subject, connected with the special work of this Society, that would be worthy of your attention; and when I looked through the reports of your previous meetings, and saw what excellent work had been done at them, my feelings were much like those of the celebrated American author who, lamenting the fate of modern novelists, complained that “all the stories had been told!” But I was struck with a remark which fell from Dr. Fortescue Fox at your inaugural meeting; he stated that “a very eminent medical man said to him that the spa physician had an ‘unrivalled field for the study of chronic ailments.’” This is so just and true a remark that I will ask you to regard what I shall say to you this evening as intended merely as a gentle irrigation of the vast field you cultivate. The late Sir Andrew Clark used to say that the London consultant practised under, in some respects, great disadvantages. It was so difficult for him to learn the results of his advice. “If,” he said, “your prescription cures the patient he rarely returns—if it fails to cure him he *never* returns.” Now your patients cannot, as a rule, escape you in this way.

I have heard of physicians at Continental spas visiting their patients in their baths—they could hardly escape then! But without paying visits of this intimate kind, it is certain that you have exceptional opportunities of carrying out a very

thorough investigation of the cases that come under your care. It is then as an appeal to your experience and as a suggestion for further observations, under these favourable conditions, that I propose to put before you a few thoughts, prompted by my own observations, on the subject of what I suggest may be termed "hepatic inadequacy." By hepatic inadequacy I mean such defect or disturbance of the functions of the liver, inherited or acquired, which, while stopping short of giving rise to what are known and generally accepted as diseases of the liver, leads yet to impairment of general health. And I shall possibly trespass on somewhat controversial ground, for I shall include in this category many, if not all, of those cases known or spoken of as cases of "irregular gout," which I am inclined to believe arise in this way. But I wish it to be understood that all I have to say on this head is suggestive and not dogmatic. You, who necessarily see so many of these cases and have such ample opportunities of investigating their histories, analysing their symptoms, and controlling their treatment, will fortunately be most competent critics of the views I shall put before you. I should like it also to be understood that these views are founded mainly, if not wholly, on clinical observations and practical experience, and that I strongly hold the opinion that when such observations are found to be inconsistent with laboratory experiments and theories founded on them, the clinical observations, if sound and accurate, must always be supreme.

It is necessary to insist upon this, because it seems to me that some of the ablest scientific workers in this field have become, as it were, fascinated by their own theories and experiments, and have overlooked the obligation of making their conclusions accord strictly with the facts of clinical medicine and clinical therapeutics.

Moreover, the results obtained and the views held by different experimenters differ widely, according to the methods they adopt, according to their confidence in those methods, and sometimes, it seems to me, according to their preconceived ideas. Therefore I maintain that those of us who base our conclusions on clinical observations have the right—I

would say the obligation—to criticise any doctrines and conclusions, put forward as the result of laboratory investigations, which do not accord fully with our actual experience of the particular morbid states concerned, as we see them in living men.

If you were to attempt the task of reading all the reports of the many experimenters who have worked at the subject of gout, you would find their results to be a perfect maze of contradictions, as irritating to the brain as the hypothetical showers of uric acid crystals in which some of them seem to believe.

Observations *in vitro* may be mutually destructive of opposing theories, but they can never be regarded as decisive of vital operations unless they are, in all respects, consistent with clinical, that is, with vital facts.

Now I propose to suggest to you that in the chronic ailments which we are accustomed to recognise as cases of "irregular gout" the clinical evidence, both with regard to the symptoms and the results of treatment, seems to point to hepatic inadequacy as being the initial cause of these morbid states.

And I think it is reasonable to infer either that these cases are improperly termed "gout" and should be termed instead cases of "hepatic inadequacy," or that "hepatic inadequacy" is the original cause of gout, and that the manifestations of regular and articular gout are the result, near or remote, of the disturbance in metabolism thereby initiated.

It has always appeared to me that clinical evidence has been opposed to the conclusion that all or the greater part of the phenomena of gout, as we now see them, are the result of uratic precipitation in the tissues, and that the widely-spread and popular idea that the treatment of gout consists in the administration of so-called "solvents of uric acid" is an erroneous one. Not only erroneous, but in the way it is now boomed positively injurious!

Nor have I been able to find any sound clinical basis for the doctrine which was advanced, I believe originally by Sir William Roberts and has been most ably supported by your

learned Treasurer, Dr. Luff, that sodium salts are injurious to gouty persons, and that alkalies are useless in the treatment of gout.

Sir William Roberts himself admitted that uric acid "did not cover the whole field of gout," and Professor Bouchard has insisted strongly on this, and I would add that uric acid not only "does not cover the whole field of gout," but we know it spreads widely over other pathological fields which have nothing to do with gout. For my own part, I have great doubt whether uric acid has any other relation to gout than that its over-production in the human body is a result of the "gouty" state—a state which I would suggest takes its origin in disturbed hepatic metabolism. This contention is an important one from the point of view of therapeutics, as it must modify greatly our ideas as to the appropriate treatment of the gouty state, and especially our views as to its prevention. And it is, I consider, most important that we should observe and carefully analyse all the clinical phenomena of gout, and the "gouty" state, with minds unfettered by preconceived chemical theories.

Without for one moment desiring to detract from the importance to medical science of physiological and chemical research, yet I think it is not always so helpful to clinical medicine as it might be, unless it is carried out in what I would call a clinical spirit, and not with the object of dogmatically imposing its conclusions on the clinical physician. And it is sometimes difficult to distinguish between the resulting facts of a research and the mere opinions of its authors. An apt illustration and example of the truth of these statements may be found in the effect that was produced some thirty years ago by the publication of the Edinburgh Committee's research on the action of mercury on the liver. The supposed results of this research, put as briefly as possible (I quote from the report), were : that mercury, "so far from increasing the flow of bile, causes its diminution, through its general depressing effect on the entire organism," and the reporter adds—"the practical advantage of demonstrating that mercury is not a cholagogue cannot be too highly estimated."<sup>1</sup>

The immediate effect of this report was that medical practitioners were afraid to order a dose of calomel or of blue pill for fear of being thought unscientific. A number of comparatively new drugs, podophyllum, euonymin, iridin, and others came into fashion and were prescribed instead of the much-discredited calomel.

But after a time practical men found that they could not get on without calomel or blue pill, and the late Dr. Hare, in an address given in 1883 before the Metropolitan Counties Branch of the British Medical Association, on "Good Remedies out of Fashion," made the following remarks :—

"I am quite aware of the experiments by which it has been proven, or said to have been proven, that mercurials are not cholagogues, but this I know, that a good dose of calomel or blue pill, given in the olden fashion, and followed by some sulphate of magnesia or other good saline purgative in the morning, will bring away copious motions of yellow, green, or black matter, such as you do not get otherwise, and one feels after that light and buoyant and bright, and with a head clear for work, a state such as one has not felt in perhaps for weeks before ; the melancholy—the black bile—has been removed."

Now, gentlemen, what, after thirty years, is the teaching of physiologists in the present day as to the action of calomel ? It is that, although calomel does not really cause an increased formation of bile, it acts on the bile-expelling mechanism, and promotes the flow of bile into the intestines, there to carry on the chemical and other changes in the intestinal contents which it is known to produce ; and it necessarily also promotes its elimination. Is this not an important effect ? Was more than this claimed in calling calomel a cholagogue ?

Is it a small matter to clear the bile passages of possibly thick, viscid bile and mucus, when perhaps there is also some slight catarrh of the bile ducts ? Is it a small matter to clear the way for a fresh onflow of bile along the natural passages, partially obstructed by a languid current ? Well, we now no longer hesitate to prescribe calomel for fear of being thought "unscientific." I do not think I am saying too much when

I say we know it promotes, indirectly if not directly, the hepatic functions, especially the excretory functions of the liver, and that it is a remedy for "hepatic inadequacy."

A patient of mine, a "gouty" patient, a few years ago went for a course of treatment to one of our famous English spas; she was treated by a physician of eminent skill and repute—a distinguished member of this Society. When she returned, greatly improved in health, she told me that physician had given her—besides the waters she drank—a calomel pill every or every other night. Evidently he was not of the opinion of the Edinburgh Committee, that "the practical advantage of demonstrating that mercury is not a cholagogue cannot be too highly estimated."

Indeed, calomel is, I should say, nowadays used as extensively as ever it was in the treatment of chronic disease, especially in functional disorders of the stomach and liver, in which I venture to include many forms of so-called "irregular gout." I find in Martindale's interesting analysis of recent prescriptions, podophyllin was prescribed 189 times, euonymin 238 times, and calomel 837 times.

Now there is another inquiry to which I think you might advantageously devote the special means of practical observation which you possess, and that is, what is likely to be the effect on practical medicine of the recent experimental impeachment of the use of sodium salts and alkalies generally in the treatment of gout and the gouty state?

Have all the physicians of the world been wrong in sending their gouty patients to drink alkaline waters rich in sodium salts? Have we all of us who have any tendency to gout been daily provoking the precipitation of sodium biurate in our tissues by drinking freely of those common table waters containing sodium bicarbonate which are so popular? Have all persons with gouty antecedents, with whom I should have to be included, been wrong in taking sodium chloride with their food? Then I would ask you to remember that sodium chloride and sodium bicarbonate, and other sodium salts, are always present in normal blood, and if these are the agents in the precipitation of sodium biurate

in the tissues, they are always there in the blood to effect that undesirable result, whether we do or do not take them into the stomach in the shape of food or medicine ; and obviously they must normally reach the blood through the food we take. But the chemical argument assumes this form : Those who give sodium salts and other alkalies in gout do so in the belief that they dissolve uratic deposits in the body, and as it can be shown that out of the body they do not do so, therefore this practice must be wrong.

To this argument I reply that so far as I am concerned I do not give these salts with any such object, save in the case of urinary and renal uratic deposits, in which their utility has never, I believe, been seriously doubted. I give them because I believe they are most useful—especially the sodium bicarbonate—in promoting the healthy function of the liver and in favouring metabolism generally. I believe the alkalies do this, to some extent, by promoting osmosis. Physiologists appear to be agreed that sodium chloride, “in passing through the body, fulfils the useful office of stimulating metabolism and secretion.”<sup>2</sup>

Many of you must have noted the rapid effect of drinking a warm solution of sodium bicarbonate in thinning the tenacious mucus secreted in the so-called “dry” or “gouty” catarrhs of the air passages. It is the best expectorant we possess for this purpose, especially when combined with sodium chloride. This is, as you know, the explanation of the well-known value of Ems water in the treatment of such cases. It certainly also promotes the flow of urine, and doubtless also the flow of bile.

The remarkable effect of solutions of sodium salts on the hepatic functions is shown by their curative effect in “gouty” and dietetic glycosuria. The remedial influence of the alkaline sodium waters of Carlsbad, Neuenahr, and Vichy on such forms of diabetes cannot be disputed.

We must all have seen numerous instances of their remedial action in other forms of so-called “gouty” disorders. When, a good many years ago, I was house-surgeon to a county hospital, the chairman suffered from chronic gout and

renal colic; he used to go for relief to Vichy, and he was in the habit of showing me on his return, in a bottle, some dozens of roundish concretions of uric acid which he parted with during his course at Vichy.

I will mention another, quite a typical case, and one of many. A gentleman over middle age was sent to me by his country doctor, in June, 1894, as suffering from "gouty" headaches of a severe kind, which had tormented him for many years, and he wished me to advise him as to what spa he should visit. I advised him to go to Marienbad. He went there for five consecutive years, drinking these waters, rich in sodium salts, with entire relief to his headaches, and he is returning there this year.

Another gentleman, who has been under my observation for more than twenty-five years, a member of a gouty family, and who has been most anxious to avoid similar gouty troubles himself, to this end, for more than a quarter of a century, has dosed himself with alkalies daily—sodium bicarbonate chiefly, but also potassium bicarbonate, and magnesium carbonate. He is an exceptionally large eater, taking much animal food, which he firmly believes he needs to "support his system." He frequently drinks at meals champagne or port, diluted and in moderate quantity. His urine is almost always faintly alkaline, and is passed in considerable quantities. He has never had any true gouty attack, nor any signs of uratic precipitation. He is now 60 years of age, and he considers that in the past five years he has been in better health than at any period in the last twenty-five years. He is a scholar and an acute logician. If you were to ask him, on theoretical grounds, to leave off his soda and other alkalies, he would argue that he owes to them his freedom from goutiness and his ability to digest large quantities of animal food which he needs for his support, and that he owes his present good health to taking them.

Again, those who accept this experimental argument against the use of sodium salts in the gouty might be tempted to starve the blood of these its necessary constituents, and so disturb seriously the processes of general metabolism. Even

if we were to accept this explanation of the mode of precipitation of sodium biurate in the joints, it only explains an incident of gout, an incident which we know does not always occur, and an incident which we also know may occur without giving rise to any of the symptoms of gout. I have often seen uratic deposits on the helix of the ear in persons who have never had any knowledge of having suffered from any of the symptoms of gout ; but the true pathogeny of gout must be sought for in some disturbance of function antecedent to the accumulation of urates in the blood, which accumulation occurs in other diseases beside gout, and I believe it will be found in disturbances of hepatic metabolism—in short, in hepatic inadequacy.

We may therefore believe that sodium salts exert their remedial influence by a beneficial action on the gastro-intestinal and hepatic functions, and on the nutritive changes in the tissues, quite irrespective of any direct solvent action on the sodium biurate. By their action on the liver they may prevent "the excessive introduction of urates into the circulation," or by their stimulating action on the kidneys they may counteract the tendency to their "unduly lingering in the blood and accumulating therein," so that their influence may be in the truest and best sense remedial, inasmuch as they would attack the morbid processes at their origin and source.

As to the argument that attacks of acute gout are frequently induced while taking a course of sodium waters, I admit that such attacks no doubt do occasionally occur, but certainly not frequently, and they occur quite as frequently at other spas. Dr. Fortescue Fox has called attention to this fact in the able paper he read before this Society on "Articular Gout," where he states he has had to bewail similar occurrences at Strathpeffer. "Bitter experience," he says, "has taught me that the routine treatment by waters and baths, with reduction of dietetic supply and augmentation of waste, whilst it removes the gouty symptoms from one man increases them in another."

I have already pointed out that Sir William Roberts has himself maintained that uric acid does not "cover the

whole field of gout," and that, "if uric acid were altogether eliminated, a pathological entity would still remain and be recognisable as gout."<sup>8</sup> And Professor Bouchard says: "It has by no means been demonstrated that in gout uric acid is the only or even the chief matter contaminating the fluids . . . many of the chronic lesions of gout are in part composed of or occasioned by precipitated urates; but the disease itself is not due to uricæmia."<sup>4</sup>

If we refer to an American authority on gout—Professor Lyman, of Chicago—we find him convinced of the value of alkaline and sodium waters in gout. He says: "It has been proved that the administration of alkaline waters promotes the flow of bile, and is followed by an increase in the amount and activity of the digestive fluids. . . . As a general rule it may be asserted that the salts of sodium are safer and better tolerated than the other alkaline salts;" and he refers to the fact that Charcot and his pupils have given for months at a time an ounce a day of sodium bicarbonate without the slightest ill-effect.<sup>6</sup>

Then both Professor Bouchard and Professor Lyman call attention to the close relationship between gout and biliary lithiasis. Bouchard found that of 100 cases of biliary calculi under his observation 30 per cent. had gout among their hereditary antecedents. It has also been noted that young women who in early life have suffered from biliary colic tend, later on in life, to develop gouty arthritis, and occasionally, after the establishment of articular gout, it happens that its crises alternate with the attacks of colic, "affording a complete demonstration of the close relationship that exists between the two disorders." Now the value of sodium salts and waters in the treatment of biliary lithiasis cannot be questioned.

But it may be asked, what are the symptoms referable to hepatic inadequacy presented by patients with irregular gout?

In the first place, the fæces are often pale, from the absence of bile-colouring matter, and often very offensive: there is often constipation, but sometimes more or less diarrhœa. Some enlargement of the liver may frequently be made out with tenderness on pressure where it is uncovered. The com-

plexion is often muddy and the conjunctiva yellowish, and the patients often complain of a sweetish bitter taste in the mouth and loss of appetite. The urine is high coloured and often of high specific gravity. I have found it frequently range between 1028 and 1036. It is usually extremely acid, and it gives a colour reaction which I have been led to associate with disordered hepatic functions. On boiling and adding nitric acid various shades of mahogany colour are developed, so pronounced in some instances that the urine looks almost as black as ink in the test tube, while in others there may be only a faint purplish tint. But this coloration of the urine with heat and nitric acid is very common in the gouty state, and it is also commonly found in functional and malignant hepatic disease.

It has seemed to me that, so far from the kidneys being functionally diseased in these cases, as has been suggested, they really eliminate excrementitious substances that are normally excreted in the bile, and hence this colour reaction. It is certainly not dependent on constipation, because it is not very uncommon to find diarrhoea co-existing.

These are symptoms which I suggest go with disturbed hepatic metabolism and imperfect excretion of bile.

Dr. Myrtle has described an aggravated form of this condition in an interesting paper in the Transactions of your Society under the title of the "Gouty Liver," but as Dr. Kerr has suggested, I think a better title would be the "Liver in Gout." I believe also that I am following in the footsteps of that eminent clinical observer, the late Dr. Murchison, in thinking that the initial trouble in gout is disturbed hepatic metabolism.

Now the bile-secreting cells of the liver in some persons seem extremely sensitive to what appear very slight influences, while there can be no doubt as to the intimate correlation between the three great eliminating organs—the liver, the kidneys, and the skin.

A single morphine lozenge will produce pale stools immediately in certain persons. Alcohol, emotion, chill, will do the same in others. A well-known statesman used to have

a fit of gout or become "gouty" if he ate a few strawberries ! It was doubtless the knowledge of a few facts like this that led the late Sir Andrew Clark to forbid his gouty patients to take fruit.

We know how much more common it is to get attacks of irregular gout during the cold north-east winds of spring. The skin gets chilled and its excreting functions impaired, and this chilling of the skin seems sometimes to be reflected on to the excreting function of the liver, and we get what we have been accustomed to term of late years a "liver chill !"

Here, again, we see a probable connection between liver inadequacy and goutiness.

There is another type of hepatic inadequacy in which I know the members of this Society take an especial interest. I might perhaps call it "the liver of the seaside." A very striking case of this kind was sent to me some years ago by my friend, the late Mr. Jowers, of Brighton. A middle-aged American lady had been spending three months at that resort, and had been suffering the whole time from symptoms which were thought to be of an obscure nature by the homœopathic practitioner under whose care she had for some time remained ; and as she was getting no better and becoming extremely anxious about her condition she consulted Mr. Jowers, who at once ordered her to leave Brighton and come to London. When I saw her she was in a wretched state of mental depression : she was impressed with the belief that she was most seriously ill and that she would never return to America alive. When I inquired into her symptoms I found she had lost all appetite, that she had a headache, a "bad taste" in her mouth, a flabby, coated tongue ; she was constipated, with pale stools, her urine was of high specific gravity, throwing down lithates, and becoming of a mahogany colour with heat and nitric acid. The liver dulness was somewhat increased, and there was tenderness over its free border in the epigastrium. I reassured her as to the nature of her symptoms, and pointed out to her that she was suffering from what had been called 'Brighton dyspepsia,' and that she would soon get well now

that she had left that place. I gave her some small doses of calomel on alternate nights, a sodium bicarbonate and nuxvomica dose before each of her meals, a glass of Carlsbad water on alternate mornings, and, as her heart was very weak from the long-continued dyspepsia and loss of appetite, I got her some very fine old Cognac at 25s. a bottle, which helped her to recover tone and strength. She soon got better, and a few weeks later in the season I met her in Paris, cheerfully enjoying the legitimate pleasures of that gay capital.

It has been suggested by some members of your Society that those symptoms attacking certain visitors at the seaside might be due to the ozone in the air. I do not think so, because I have noted again and again that such symptoms are never observed in anything like the same degree in seaside resorts where visitors can dwell three or four hundred feet above the sea. It is when they are obliged to live near the sea and on a level with it that these symptoms are most prone to arise.

I believe it is some subtle influence which checks the activity of the bile cells, and you thus get developed a form of hepatic inadequacy. What that subtle influence is I do not know; it may be analogous to that which excites asthma in certain places in certain people, for I have known an asthmatic patient have asthma badly at Deal, and, when at my wish he moved to Folkestone—only a few miles further west, but not on a level with the sea—the asthma left him while driving from the station to his lodgings in the latter place, and did not return while he remained there.

You will also find that if gouty patients are sent to the Upper Engadine they often get very uncomfortable in that bracing climate. They lose appetite, become constipated, have pale stools, and if they have hæmorrhoids, these become much more troublesome, and their skin sometimes assumes a subicteric hue. If they leave the Engadine, as they should do, and go to a resort on a lower level, they generally soon get well. I have seen exactly the same thing happen at the Riffel Alp, for these elevated stations are unsuited to the gouty.

But there are physiological reasons as well as clinical

reasons for incriminating the liver in the production of the gouty state. We know that the liver is specially concerned in the metabolism of carbohydrates—its glycogenic function—and also in the metabolism of nitrogenous material, the formation of urea and uric acid. Halliburton says: "The facts of experiment and pathology point very strongly in support of the theory that urea is formed in the liver;"<sup>6</sup> and again, "uric acid is not made by the kidneys. Experiments point to the liver as the seat of its formation:" "It is probable that ammonia and lactic acid are normally synthesised in the liver to form uric acid."

We know also that in the gouty one of these functions—the glycogenic—is often disturbed, and is restored by alkaline (sodium) medication; is it not reasonable to conclude that another function of the liver, carried on side by side with this one, is also prone to be disturbed, for we clinically see it restored by the same means.

Again, another function of the liver is the formation of bile; this is regarded by many physiologists as a subsidiary one, "bile containing the waste products of the liver, the results of its other activities,"<sup>8</sup> and this third function we also find disturbed in the gouty.

Perhaps you will allow me in conclusion to offer for your consideration one or two suggestions as to the influence of diet in these cases. Apart from individual peculiarities which are common in the gouty, my impression is that the safest diet for these patients is the simplest diet. It is a mistake to dogmatise about diet for the gouty. We must study their individual dietetic capacities and adapt the diet to them.

A vegetarian diet may suit some, but it has not fallen to my lot to meet such cases. But I am bound to admit that I have seen the most troublesome gouty headaches disappear, and a condition of greatly improved health result from an exclusive, or nearly exclusive, diet of pounded meat with liberal draughts of hot water. I have rarely prescribed this diet myself, but I happen to have been officially brought into contact with those who have been following this mode of treatment, and I have not been able to resist the evidence of

its success in some cases, and although in one instance the patient seemed at first to be made very weak and thin, yet he was free from headaches, and after perseveringly following the treatment for some months, ended by finding himself in better health than he had been for many years. Now the reason of the success of this treatment in such cases is, I think, plain. The pounded lean meat diet is about the simplest that can be offered to the feeble digestive organs, and physiologists tell us that "proteid food increases the quantity of bile secreted," and the large draughts of hot water flush the excretory ducts both of liver and kidneys. Extremely simple food, limited in amount, meaning as it does digestive ease, means also freedom from goutiness. I have ventured to paraphrase a couplet of Dr. Watts :—

" *Nature* finds some mischief still  
For idle *food* to do."

To cure goutiness we must get rid of this "idle food"—food which is in excess of our wants and a trouble to our metabolism.

There is much also in the quality and cooking of food, often more, to my thinking, than in the kind of food. The difference in the wholesomeness and digestibility of different specimens of bread is remarkable, and so it is with joints of meat, poultry and fish.

I could extend this remark as to quality to wines also. The late Professor Tyndall once told me that an eminent London physician advised him to drink "claret." "But," he said, "I asked him, 'What claret?'" So far as my observation goes, claret is really one of the most risky wines to prescribe without regard to its kind, for a gouty patient, and when I see "port" put at the head of a list of wines which induce gout, I am inclined, like Professor Tyndall, to ask, "What port?"

One of my gouty patients, who is a fine judge of wines and a very careful liver, has excluded every wine from his dietary except port, of which he drinks two glasses daily. He has suffered for many years from gouty headaches, and

has had deposits of sodium urate removed from his eyelids ; but he has never had articular gout, and keeps in very fair health, and for the last five or six years has had no serious gouty symptoms. I find a dry port, long in the wood, if it is freely diluted with hot water, one of the best and safest wines for those gouty people who need some stimulant. Gouty women, I find, bear all wines badly. Many gouty patients can drink a small quantity of a well-matured, high-quality wine—even champagne and port—especially if diluted with water, who would be made ill by a single glass of common claret. The more diuretic the effect of the wine proves to be the more suitable it is to the particular case.

There seems to exist a general impression that the gouty person is one who does not take an adequate amount of physical exercise, and that he must be ordered to take more. Now that is not my experience. The gouty patients that I have seen have, I should say, in the majority of instances, been extremely active and energetic people, and it is often difficult to get them to take sufficient rest. This excess of muscular activity constantly leads them to take an excess of food, and then trouble arises because their excretory organs can hardly keep pace with the waste produced in the body ; this is especially notable after middle age, when the activities of the excreting organs become reduced, and both liver and kidneys may become inadequate.

A well-known physician returning home from his morning ride in the park met the late Sir James Paget, and asked him why he did not ride in the morning. "Why should I?" asked Sir James. "Oh! to shake your liver up," replied his friend. "But I don't wish to shake up my liver," said Sir James ; and I think there was a great deal of practical wisdom in that reply.

But I must not trespass longer on your kind attention. I have ventured to ask your consideration of some practical reflections as to the relation of the liver to goutiness. As I said at the beginning, I wish to avoid all tendency to dogmatism in a matter which is so open to differences of opinion ; but we must also be careful not to be led away by the dog-



**BRITISH BALNEOLOGICAL AND CLIMATOLOGICAL  
SOCIETY.****COPY OF MINUTES.**

AN ordinary meeting of the Society was held on Wednesday, April 17, 1901, at 20, Hanover Square, Dr. Frederick Bagshawe, J.P., President, in the Chair.

The minutes of the last meeting were read and confirmed.

The following candidates were nominated for election at the next meeting :

John Dodd, M.D., M.Ch., Leicester.

W. H. Davies, M.D., M.R.C.P., St. Leonards.

G. W. B. Daniell, M.R.C.S., L.R.C.P., Caledon, Cape Colony.

The following candidates were elected by ballot :

James Little, M.D., F.R.C.P., Dublin.

Roderick Sim, M.R.C.S., L.R.C.P., Monte Carlo.

Chisholm Williams, F.R.C.S., London.

Dr. Symes Thompson read a paper on a comparison of "The Climate of Algiers with that of the Riviera."

Dr. MAHOMED (Bournemouth) read a paper entitled "Polypharmacy in Medicine."

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**COPY OF MINUTES.**

THE ordinary meeting was held at 20, Hanover Square, Friday, May 31, 1901. The President, Dr. Frederic Bagshawe, in the Chair.

The minutes of the last general meeting were read and confirmed.

The following candidates were passed for nomination at the next ordinary meeting :

W. Gordon, M.D., M.R.C.P., Exeter.

Neville Wood, M.D., M.R.C.P., London.

A. Reuben Aubrey, M.D., M.R.C.S., Weston-super-Mare.

Major A. A. Pechell, R.A.M.C., M.B., C.M., Alton, Hants.

The following candidates were elected by ballot :—

John Dodd, M.D., M.Ch., R.U.I., Leicester.

W. H. Davis, M.D.(Oxon.), M.R.C.S., St. Leonards.

G. W. B. Daniell, M.R.C.S., L.R.C.P., Caledon, Cape Colony.

#### THE GENERAL MEETING

was held at 20, Hanover Square, May 31, 1901, the President in the Chair.

The minutes of the last general meeting were read and confirmed.

Dr. Campbell Pope and Dr. Page May were appointed scrutineers of the ballot for the Council and Officers.

Drs. Clippendale and Ernest Clarke were appointed auditors of the accounts for the coming session.

The following report of the Council on the state and prospects of the Society was presented and adopted.

#### REPORT OF THE COUNCIL.

The Council have pleasure in presenting to the Fellows of the Balneological and Climatological Society their sixth annual report. They welcome the signs of vigour and vitality shown by the Society during the past session, as evidence that it already meets a want, and is destined to occupy a useful position in the medical profession.

On the occasion of the *Conversazione* in May last, Sir Joseph Fayrer contributed a valuable address on the "Hill Stations of India as Health Resorts," and favoured us with much interesting information on a little known subject of scientific as well as national interest.

Five ordinary meetings of the Society have been held for the reading of papers and discussions.

Dr. Frederic Bagshawe, of St. Leonards, our esteemed President for the past year, took for the subject of his address, "Some Points in the Development of Seaside Towns," and dwelt upon the special responsibility that in the public interest devolves upon medical men connected with our various marine health resorts.

Papers have been read by Dr. Edward Waddell, on the "Suppression of Malaria," and by Dr. Mahomed, of Bourne-

mouth, on "Polypharmacy in Medicine," whilst Dr. Symes Thompson gave us the results of personal observations amid the Health Resorts of northern Africa, in an interesting paper on the "Climate of Algiers."

A discussion on "Anæmia and its Therapeutics," was opened by Professor Allbutt, and occupied two evenings.

We believe that such discussions, of which several have now taken place in our Society, may serve a useful purpose, by bringing to a focus the large practical experience of many practitioners at the British spas and climatic resorts. The therapeutics of some common chronic disorder, or group of disorders, studied from a balneological and climatological point of view, must necessarily be of interest not only to our own Fellows, but to the profession at large. We hope that such discussions may be continued from year to year and form one means, amongst others, of systematising and recording for the common use the experience gained by our members at the various health stations.

The attendance at the several meetings and the interest shown in the papers and discussions have been well maintained during the past session.

The Society now numbers 373 Fellows. Four have been lost to us by death during the year, namely, Dr. Alexander George Davey, of Ryde, a Member of Council; Dr. James Nicol, of Llandudno; Dr. D'Oyley Pain, of Bembridge; and Dr. W. Stewart, of Sydney, New South Wales. We have also to record the resignations of 33 Fellows, a figure which have been abnormally swelled during the past year by a more stringent application of the rule regarding subscriptions. On the other hand, the newly-elected Fellows number 49, which makes a net increase of 12 in the roll of the Society.

It may be of interest to note that the membership of the Society is now divided between London and the country, in the proportion of nearly 1 to 3. Of the 49 new Fellows, 4 reside in London, 11 at various English spas, 7 in the French and Italian Riviera, and the remainder (22) in the country, including 19 at seaside stations. The Council regard with satisfaction the increasing part taken in the active proceedings

of the Society by Fellows closely connected with the health resorts.

We have to report with regret the resignation of Dr. Luff as Treasurer of the Society.

The Society's library, under the kind care of our Librarian, Dr. Morgan Dockrell, is at present housed by Messrs. Bale, in Great Titchfield Street, where it is always available for the use of Fellows.

The Quarterly Journal of the Society has been widely circulated during the past year, and we trust, takes a useful part in promoting the purposes for which the Society was founded.

We are sensible of the encouragement and the recognition that the Society has received as the representative and the mouthpiece of British Balneology and Climatology. The importance of these subjects, both to medical science and to the public good, requires that they should be increasingly and adequately cultivated in this country.

We trust that this Society will always keep this purpose, amongst others, steadfastly in view, and by general adherence to the lines already laid down in the past, by cautious development from time to time, and gradual adaptation to the extending scope of its activity, it may more and more fulfil its purpose in the future.

Dr. SOLLY (Harrogate) suggested the advisability of securing papers on special chronic disorders at the ordinary meetings of the Society.

A discussion ensued as to the hours of meeting during the next Session. It was suggested that one meeting in the Session might be held at 6 p.m. Finally, the question of deciding the hour of meeting was left to the Council.

Dr. IVOR MURRAY then brought forward the motion standing in his name on the agenda paper, viz.:—"That Rule 52 should be altered to make London practitioners eligible for the Presidency of this Society."

After a lengthy discussion Dr. IVOR MURRAY proposed the following amendment in Rule 52, viz.: "That the following words, 'residing at, or connected with reputed British Health

Resorts,' shall be struck out, and that in the third line the word 'town' shall be substituted for the word 'Health Resorts.'" The Rule would therefore now stand as follows : "Only Ordinary Fellows shall be eligible for the office of President, and no two Presidents shall be chosen from the same town within five years."

#### THE ANNUAL DINNER

was held at Limmer's Hotel, on Friday, May 31, 1901, at 7 p.m. Sir Wm. Church, Bart., Dr. Pavy, Dr. Acland, Dr. Burney Yeo and Dr. Theodore Williams were the guests of the Society, and the President. Sir Wm. Church, Bart., President of the Royal College of Physicians, in proposing the toast of the Society mentioned that a second volume of the "Spas and Climates of Great Britain," would shortly be published by the Royal Medical and Chirurgical Society, and suggested that the Fellows of this Society should avail themselves of the opportunity of purchasing a copy of the book, which has been produced at a very great expense.

Dr. FORTESCUE FOX responded on behalf of the Society.

#### THE ANNUAL CONVERSAZIONE

was held at 20, Hanover Square, at 9 p.m.; was very successful and was largely attended.

The PRESIDENT (Dr. Frederic Bagshawe, St. Leonards) introduced the Lecturer, J. Burney Yeo, Esq., M.D., F.R.C.P., and in opening the proceeding, said his duty was very short, and practically consisted in introducing to the meeting Dr. Burney Yeo, who had been kind enough to consent to lecture to them. He said he was very happy to see assembled there not only a large number of Fellows of the Society, but many visitors, who had honoured them by being present. Kindred societies to the British Balneological had been established, not only in this country, but in most continental countries, and also in America. The movement was believed to be bringing good fruit in those countries, and he thought they were likely to continue doing so. In foreign countries, especially in France, they knew that such work as balneology and clima-

tology practically became a Government department, being under the rule and regulation of the Government, and was State-aided. Such control in England would be very much opposed to the national feeling; it was not wanted in Great Britain, and we could well do without it. Still, there was no reason why English physicians should not take many lessons from countries which were more ruled by the powers that be. He thought they could follow some of the doings of foreign Balneological societies. For instance, in France, a tour of inspection of various watering places was conducted, where the young practitioner obtained a good acquaintance with the various health resorts of his country. He did not know whether that was done so systematically in Germany, but the young German student used to put his pack on his back and go about to acquire a knowledge of the bath establishments of his country. America was following on much the same lines, and it was for English medical men to say whether tours of inspection of the same character should not be instituted. Anything that could be done in the direction of systematising balneology and climatology and working out the subject in a more satisfactory way must be an advantage. Sir William Church had said, at the dinner, that they might go upon the lines of the Medico-Chirurgical Society, and he (Dr. Bagshawe) wished to express the thanks of the Balneological Society to that sister association, in whose rooms they had met, for showing the way to a more practical study of the subject. That Society had given the profession a store of information, which it would be their endeavour to advantageously follow up.

He would not speak longer, as he knew the meeting was anxious to hear what Dr. Burney Yeo would say, particularly those who had been dining together and were, perhaps, suffering from some degree of hepatic inadequacy.

Dr. I. Burney Yeo, M.D., then read his paper on "Hepatic Inadequacy, and its relation to Irregular Gout."

Dr. SYMES THOMPSON said that when the Fellows heard that they might look forward to an address by Dr. Burney Yeo they felt quite sure it would be one full of literary charm

and of practical counsel ; but probably none were quite prepared for such a very charming and delightful address as they had just heard. Many points referred to would be carefully borne in mind and would be of help. A remark which seemed extremely appropriate and which the physician felt very keenly, was that he had no opportunities, like the spa physician, of seeing the patient under the influence of the methods which he prescribed. That was one of the great trials of the London physician. Dr. Yeo had reminded them of Sir Andrew Clark's saying that if the physician cured the patient he saw him no more ; neither did he if he failed to cure him. The spa physician had the enormous advantage of being able to adapt his methods to the varying conditions from day to day, and thus of securing a result which was quite impossible from one casual visit, even though the lines of treatment so ordained might be the best possible.

A point full of helpfulness in the address was the increasing appreciation felt by the profession for the mercurials, which were set aside by authority a few years ago. He thought what Dr. Yeo had said carried conviction to all present. Whilst one was unwilling in days gone by to give mercurials because their action was not understood, one was now satisfied in prescribing them, because their working was known. Not only was the benefit due to osmosis, as had been mentioned, but also to their disinfecting action. As to the alkaline and soda salts, that was a matter of the very greatest value. It was much appreciated in London, both in in-patient and in out-patient practice. Physicians at Brompton hospital had often been chaffed on account of their fondness for the alkaline mixture so invariably ordered, as patients often took more food than they could properly digest. With the alkaline mixture and a bitter they prospered enormously. That was seen still more in spa treatment. Such an address as that just delivered was calculated to bring into prominence the value of those springs, not only abroad but in England, of which there was a very good choice. Early in the present year he had the pleasure of visiting some of the spas in Algeria, and was much struck by the value of some of the

springs there. His particular purpose was to express to Dr. Yeo for those in the room the thanks of the Society for his very valuable address.

Dr. DOUGLAS KERR (Bath) said he had very great pleasure in seconding the vote of thanks to Dr. Yeo for his very interesting paper. The members of the Balneological Society must feel especially happy in welcoming among them, and hearing words of wisdom from a gentleman who had associated himself, before the birth of the Society, with balneological and climatological subjects. He (Dr. Kerr) well remembered, in the eighties, the impulse in the study of health at health resorts by reading Dr. Burney Yeo's book, which was first published under the title "Health Resorts and their Uses," and subsequently with some alterations, "Climate and Health Resorts." It was not his intention to discuss the paper, but to second the vote of thanks and say how much pleasure it had given him to listen to the address.

The resolution was carried by acclamation.

Dr. BURNEY YEO said he was very much obliged to the proposer and seconder of the vote of thanks, and to the Society generally for the very kind reception of his paper. When he was first asked to give an address he hardly knew what he could bring forward, and it was not until he saw the very pointed remark of Dr. Fortescue Fox at the inaugural meeting, to which he had referred, that it occurred to him he might occupy, not unprofitably, a little time in the discussion of hepatic inadequacy.

The PRESIDENT said he would like to mention that a note had arrived from Sir Edward Sieveking expressing his great interest in the Society, and his continued wish for its welfare. Sir Edward was, and had been for some time, Hon. President of the Society.

An exhibition of appliances, microscopical specimens, instruments and drawings was provided as follows :—

The President and Dr. Davis (Hastings) : Pictures of old Hastings and recent photographs.

Dr. Morgan Dockrell : A beautiful series of microscopic specimens, including *tinea circinata*, *pityriasis versicolor*,

erythrasma, filaria, filaria in mosquito, tinea imbricata, actinomycosis (hyalin bodies), actinomycosis, madura foot, old skin, favus, ringworm (small spore), ringworm (large spore). These were arranged and exhibited by Dr. Morgan Dockrell.

Dr. Charles Begg (Bath) : Douche-massage chair.

The Bath Corporation : Model of the Roman Baths of Bath.

Dr. Glover Lyon : Electric Ventilating System, with a 220 volt circuit, by the Sturtevant Co.

Mr. Chisholm Williams : Dean's Apparatus for producing electrical currents of high potential and high frequency. This apparatus can be used with great success for X-ray work, and has a 12-inch coil. There were also shown glass electrodes for the painless treatment of hæmorrhoids, sinuses and tubercular affections.

Harrogate Corporation : Combination of douche and needle-bath.

Dr. Cecil Musgrave : Photographs of Cromer.

Messrs. Negretti and Zambra : Meteorological instruments, including a self-recording rain-gauge, a barograph, a combined barograph and thermograph, and a thermometer capable of indicating a temperature of  $-104^{\circ}$  F.

Messrs. Oppenheimer : Pharmaceutical Preparations.

Mr. Frank Rogers : Pharmaceutical Preparations.

Messrs. Callard and Co. : Dietetic Preparations.

Messrs. John Bale, Sons and Danielsson, Limited : Books.

Mr. Alfred Cox : A fine and very complete set of surgical and obstetrical instruments, and X-ray apparatus.

## Notes from the Spas and Sea-side Stations.

### BLACKPOOL.

Elevation above sea level = 80 feet at North (the fashionable) end of the town. Mean humidity = 82·45. Saturation = 100. Rainfall = 36·9 inches. Mean temperature (maximum and minimum combined) = 49·15. Maximum daily range = 14. Minimum daily range = 7·8. Bright sunshine = 1,406 hours, 08 minutes. Prevailing wind W.-S.W. Characteristics of climate : equability, rarity of frost and snow, clearness of atmosphere and unusual prevalence of sunshine.

Jan.	1900	there	was	48·24	hours	of	bright	sunshine.
Feb.	"	"	"	76·48	"	"	"	"
March	"	"	"	115·81	"	"	"	"
Nov.	"	"	"	52·38	"	"	"	"

All the above statistics refer to 1900, which fall below the average as regards sunshine and above it as regards rainfall.

*Baths.*—Open sea-bathing ; three luxuriously equipped baths where complete hydropathic treatment may be obtained—skilled masseuse and masseurs. Aix-les-Bains ; Nauheim (by special arrangement) ; electric ; sea-water baths of all kinds, including heated swimming in cold weather.

*Seasons.*—The "Tripper Season" begins the second week in July and ends the end of first week in September.

For invalids the town is becoming more and more popular from September 1 until June 30, since it has become known how agreeable and invigorating the climate is, what a large amount of sunshine is to be enjoyed, and what a variety of places of amusement there are.

*Death rate* = 14·35. *Population* = 50,000.

*Railways.*—L. & N.W. and L. & Y., viâ *Preston*. Trains run from Preston to Blackpool about every forty-five minutes. Through trains run from all the chief Lancashire and Yorkshire towns.

*Water Supply.*—This is absolutely unrivalled, and has been cited by the Local Government Board as a standard of what a

water supply should be. It is under the direction of a joint authority of Blackpool and its neighbouring health resorts. Its source is absolutely uncontaminated moors, north of Garstang, eighteen miles from Blackpool. There are not as yet any restrictions in its use, the supply being practically unlimited. The water is palatable, very excellent for cooking and all domestic purposes.

*Amusements.*—The accusation of dulness cannot be brought against Blackpool. Unlike other sea-side resorts, it does not cease to be a place of amusement when the days begin to shorten. From Whitsuntide until the middle of October there are a greater number of really high-class entertainments than in any other town or city in the kingdom, and they are all contained within a circle of a quarter-of-a-mile radius. Two beautiful theatres, four variety theatres, two circuses, three palatial ball-rooms, three piers with pavilions, each of them used for a really artistic concert every night, and an orchestral entertainment during the day.

During the other months of the year two good companies appear at the theatres every night and a variety theatre is in full swing as well. Mr. Charles Wyndham, Mr. Wilson Barrett, and all the best provincial companies, are represented during the winter, autumn and spring, when also concerts are held with such artists as Patti, Albani, Ada Crossley. A musical festival under Dr. Richter's direction was held last May, and is to be an annual function. Subscription balls are also given.

The hotel accommodation has much improved, and the same comfort may now be enjoyed as in Northumberland Avenue.

*Local Government.*—By a special Act of Parliament the M.O.H. and his staff supervise not only the sewerage and house sanitation, which are quite up to date, but are also empowered to enter and inspect all hotels and lodging houses, all farms from which milk, &c., enter the town. All meat has to pass through the M.O.H. and veterinary departments before it can be exposed for sale.

A sanitary certificate can be obtained from the M.O.H. All refuse is burnt at a destructor situated outside the town.

*Recent Improvements.*—Pavement of streets with karri blocks, asphalt and concrete-flag pathways throughout. One and a-half mile concrete hulking with three promenades and one roadway rising behind it. The lower and middle promenades sheltered from the east enables invalids to enjoy the sunshine, and walk one and a-half miles on a dead level, an ideal bath-chair promenade.

*Natural Beauties, &c.*—Magnificent seas and glorious sunsets. Horsemen and horsewomen can gallop in perfect safety on firm sand for five miles. There are pretty drives in the neighbourhood. Livery accommodation of all kinds is to be had.

### BUXTON.

Buxton is situated on the mountain limestone, 1,000 feet above sea level. The air is dry and bracing. The mean rainfall for the ten years, 1891-1900, was 48·8 inches. The climate is cool and fresh in summer; in winter it is cold and invigorating. The heavy rainfall has the advantage of purifying the atmosphere and, owing to the porous nature of the subsoil, gets away very quickly.

The amount of sunshine is less than in most health resorts, viz., in 1900 there were 1,235 hours of sunshine and 87 sunless days (the above are taken from the Devonshire Hospital Meteorological Report), but Buxton possesses the advantage of a degree of intensity of light not often met with in other places.

The Buxton water, an indifferent thermal water springing from fissures in the limestone at a temperature of 82° F., is tasteless. It contains 21·13 grains of solids per imperial gallon, chiefly carbonate of lime 9·18 grains, carbonate of sodium, 9·8 grains, carbonate of magnesia 4·5 grains, with traces of potash, iron, manganese, iodine and lithia. It also contains large quantities of free nitrogen gas. It is used for drinking and bathing. The baths are the property of the Duke of Devonshire and are well fitted, furnished and heated throughout. They are open all the year round. There are natural, hot, reclining, shower, douche, needle and douche

massage baths. Nauheim and electric heat baths (Dowsing and Greville) are to be obtained in the town.

The season is from June to September, but Buxton is now gaining a reputation as a winter resort.

Gout, rheumatism, rheumatoid arthritis, lumbago, &c., are specially benefited by the thermal treatment. The climate is beneficial for anæmia, incipient phthisis, neuralgia, and malaria.

The average death-rate per 1,000 for the ten years, 1890-1899, was 12.1.

The present population of Buxton, Burbage and Fairfield is about 18,000, an increase of nearly 8,000 since the 1891 census. The London and North Western and Midland Railways run through carriages from London in about four hours; Manchester, by the London and North Western, is about one hour's run, and Sheffield, by the Midland Railway, is about one and a quarter hour's run. The local government is in the hands of an Urban District Council. The public supply of water, obtained from the millstone grit, is good and soft.

The sanitation of the hotels and lodging houses is good. The District Council do not give a sanitary certificate. Refuse is efficiently disposed of by a public destructor. The town is well lighted by electricity and gas.

Visitors will find no lack of amusements in Buxton. At the Winter Gardens an orchestra plays twice daily in the season, from 11 a.m. to 1 p.m., and 7.45 p.m. to 9.45 p.m. Tennis, croquet and bowls can also be played in the gardens. There are several beautiful drives to places of interest, viz., to Haddon Hall and Chatsworth, Castleton, noted for its Blue John mine, and Peveril Castle, to Dovedale and Ludchurch.

Golfers will find the Fairfield Golf Links, 1,200 feet above sea level, one of the best inland courses in the kingdom. There is also a nine-holes course at Burbage for ladies. Good fishing can be had in the Derwent, Wye and Done.

During the winter several important improvements have been made. New waiting rooms and baths have been added to the public baths. The Old Hall Hotel, under new management, has been renovated throughout. A new hotel, "The

Empire," has been opened by Messrs. Spiers and Pond. It stands in a very fine position, and is capable of accommodating 300 guests. The water question has, to the advantage of the town, been amicably settled between the Duke of Devonshire and the District Council. Our volunteers, lately returned home from South Africa, have been entertained at two public dinners, and presented with silver medals. The old custom of "well-dressing" is to be revived this month. The Open Lawn Tennis Tournament takes place in August. The town is beginning to be well filled and the prospects for the present season are good.

#### DROITWICH,

one of the oldest boroughs in the kingdom, is situated about the centre of a beautifully undulating and richly wooded valley in Worcestershire, about two and a half hours' journey by Great Western from London.

Its early history, under the name "Salinæ," shows it to have been a town of great importance during the Roman occupation, and although the first authentic mention of salt having been manufactured here is in 816 A.D., when history tells us Kenulph, King of Mercia, gave ten salt furnaces to Worcester, yet there is no doubt that the Romans used the salt springs for that purpose long before the date mentioned. At this time 816 A.D., the town was called "Wich" or "Wych," probably from the Saxon word "wic" meaning a "station," the prefix "Droit" being added sometime during the Plantagenet period, in order to denote it as a place legalised for the manufacture of salt, at a time when all other springs in the neighbourhood were stopped, to prevent the excessive consumption of wood used in the process of salt-making.

The town of recent years has been very small (the population now only just exceeds 4,000). It is situated about 200 feet above sea level and some 1,200 feet below the summit of the Malvern hills. From its geographical position it appears to lend itself very admirably to the requirements of a health resort. The climate is fairly bracing, with an absence of fogs and mists; the rainfall is smaller than most other parts of the midlands, averaging about 23 inches annually.

Average highest temperature, taking three years, is 69.91° F.						
"	lowest	"	"	"	"	47.08° F.
"	lowest ground temperature	...	...	...	...	28.00° F.

On account of gentle undulations in the surface of the ground in the immediate neighbourhood and a luxuriant growth of trees, the town is well protected from north and north-east winds, so that sufferers from bronchial affections may live here in comparative comfort ; and what is of more importance still, the town seems to possess almost a complete immunity from infectious diseases, an occasional slight epidemic of measles or scarlet fever being all the infectious diseases we ever see. But it is in the inexhaustible supply of saline water, pumped up from the triassic formation, about 200 feet below the surface of the ground, which has been increasingly drawn upon since the year 816 A.D., and probably long before that period, that the chief value of the town as a health resort lies.

These waters are cold when they reach the surface and contain the following solids in 1,000 gallons : Chloride of sodium, 21,507 grains ; chloride of magnesium, 101 grains ; sulphate of sodium, 319 grains ; sulphate of lime, 302 grains ; and traces of bromide of magnesium and iodide of sodium ; so that, with other salts, there is nearly a saturated solution of chloride of sodium. This analysis makes the Droitwich waters twelve times the strength of the ocean and four times that of the Dead Sea.

There are two bathing establishments, "The Royal" and "St. Andrew's," containing reclining, douche, needle, swimming and Turkish baths, &c., with all necessary appliances, and recently the radiant heat baths have been added. There are also other baths—electric, pine, &c.—in some of the boarding establishments.

The oldest baths, "The Royal," date their origin from an epidemic of cholera in the year 1831, when the efficacy of the hot brine baths in that terrible disease was accidentally discovered, but it was not until recent years that systematic application of brine baths to the various forms of disease was undertaken.

There is also a hospital (St. John's) for poor patients, supported chiefly by voluntary contributions, but also by a small weekly payment from each inmate. This hospital contains thirty-two beds and supplies a need, which, from the number of applications for admission from sufferers from rheumatic, gouty, or neuralgic affections, is evidently very greatly felt; the really excellent results obtained under the guidance of the Hon. Med. Officers, Drs. Roden and Wilkinson, and the opportunity it affords for clinical research in balneo-therapeutics have stamped it as a most valuable institution.

The direct effect of the undiluted brine taken internally is that of a strong irritant to the mucous membrane of the alimentary tract, giving rise to severe vomiting and purging; in moderate doses it acts as a slight purgative, but more particularly as an alterative and as such is now extensively used; it also has gained a great reputation when applied locally to that condition known as "gouty throat" and affords great relief from the irritable cough which that condition causes, but in the form of baths it is of the greatest importance in the treatment of various affections of which the chief class is rheumatism, neuralgia and neuritis, rheumatoid arthritis and gout. In rheumatism, the chronic and many subacute varieties, whether muscular, articular, septic, &c., derive benefit; muscular rheumatism is most successfully treated, and articular varieties all gain great benefit. A glance through the records of the St. John's Hospital will strike one with the excellent work done in that institution by means of brine baths treatment, particularly in cases of rheumatism; the cures effected are a great proportion of the whole number of cases admitted, and considering that many of the sufferers are the bread-winners of families the benefits are still more striking, nor are the results of treatment of the better class patients less satisfactory.

*Rheumatoid arthritis.*—In the early stages of this insidious disease many cases are completely cured, and relief constantly follows treatment in cases where degeneration of joints has already taken place, relief from pain, and increased movements

of joints. In the still more advanced stages where contraction of limbs occurs as a result of the joint trouble, operative measures, *e.g.*, the forcible movement of joints and breaking down of adhesions are often successful, owing chiefly, I think, to the facility of application of the after-treatment by means of baths and massage, which is so effective. I do not wish to suggest that such cases are relieved solely or chiefly by bath treatment. Rheumatoid arthritis is a disease which is benefited probably to a greater degree by pure air and sunshine, rest, mental and physical, than by any waters, of whatever character they may be.

*Gout.*—In the treatment of subacute and recent cases of acute gout, brine baths must be very carefully administered in order to guard against a relapse. A bath of 98° or over will more often than not induce a return of acute symptoms, this is said by some eminent authorities to be not undesirable, in that it gives immunity from future attacks for a longer period but I fear it is too heroic a treatment ever to be much practised. Chronic gout is greatly benefited, whether articular or so-called “irregular gout,” the pain and stiffness in joints disappears, nodosities and enlargements are often reduced in size; what is still more important, digestive functions improve so markedly that future attacks of acute gout are often considerably reduced in frequency.

*Neuralgias* and neuritis are perhaps the most common forms of disease which we are called upon to treat at Droitwich, and whether of simple origin or due to some specific cause, the results certainly in many cases are marvellous. Neuralgic pains almost invariably cease during the process of immersion, and also during the “pack” which usually follows the bath, and in cases that do well there is a daily increased interval of freedom from pain immediately after each bath.

Many nervous diseases, *e.g.*, locomotor ataxy, often find some benefit from our waters, the relief of pain is often very marked, and occasionally improvements in the powers of locomotion; many cases of spastic paraplegia in early stages I have known do extremely well.

Peripheral paralysis, diphtheritic, plumbic and alcoholic, as a rule also do very well.

Some other disorders, such as anæmia, chorea, some diseases of women, *e.g.*, amenorrhœa, dysmenorrhœa, are often greatly benefited by treatment here. In the convalescence from such cases as peritonitis, where, I believe, these waters possess a great power in the absorption of inflammatory products, brine baths are very beneficial.

The action of the swimming is essentially tonic, and, I think, deserves special mention, in that it possesses one feature which is not met with elsewhere. On account of the high specific gravity of the brine, about 1.140°, the body floats easily upon the surface, with the head and feet above the water, and the bather is enabled to move his limbs freely and apparently without any effort, so that exercise of all the limbs may be taken with the minimum of exertion; this bath proves, therefore, of the greatest use in many cases where the sufferer cannot get much exercise on account of the pain and stiffness produced in the effort, and at the same time acts as a splendid tonic.

Cardiac complaints, whether organic or functional, were thought to be contraindications to the use of brine baths, but in many instances, at suitable temperatures, there are no cases which give better results, and I believe we owe much of the success which attends the treatment of some diseases, *e.g.*, rheumatoid arthritis, chronic gout, with renal inadequacy, anæmia, &c., to the beneficial influence which these waters exert upon the circulation.

The effect upon a dilated heart is well known and has often been described elsewhere.

Skin diseases contraindicate the use of brine baths; the only exception is "gouty eczema." Dry, scaly skin diseases are said to be much improved. I must confess I have not found much benefit in those cases. A simple eczema is made much worse. A trouble which very commonly arises is a dermatitis of the scrotum, but it readily responds to local treatment, and at the worst, it is seldom necessary to stop the baths for more than two days.

Patients suffering from cerebral hæmorrhage of recent date, or, in fact, any other recent hæmorrhage, should not take brine baths.

A word may be said about Droitwich generally.

- There is an extremely pretty park situated close to the bathing establishments, where an excellent band plays daily ; there is also a large hall, where concerts and entertainments of various kinds are held. Within a quarter of an hour's walk are golf links which prove a great source of amusement to visitors, particularly through the winter months. The roads are fairly level and in excellent condition, and many places of interest within easy reach prove very attractive for cyclists. We are also about the very centre of the Worcestershire Hunt, which affords excellent sport for those who are fond of hunting.

#### FELIXSTOWE.

Felixstowe is built chiefly on a plateau, from 55 to 75 feet above sea level, but partly on a tract of sandy common, only a few feet above high water mark. It is situated at the south-eastern corner of Suffolk, and is fronted by a fine stretch of sandy and shingly beach four miles long, the central portion of which faces due south.

The soil is largely composed of the loose, sandy and calcareous formation known as the Suffolk Red Craig, consequently it is very dry. The annual rainfall averages about 20 inches ; the actual fall in 1899 was 18·6 inches, and in 1900 21 inches. The climate partakes of the usual bracing, breezy nature common to East Anglian watering places, but is of a less robust type than most of them. It is specially windy in the first quarter of the year, calmer in autumn and early winter. The mean temperature for the year 1900 was 50·1°, that for the British Isles generally being, for the same year, 48·9°. The annual amount of bright sunshine registered is very large. In 1900 it was 1,878 hours. The amount for the East of England generally for the same period was 1,680 hours, for the South of England, 1,737 hours.

The season is August and September. The beauty of the climate in autumn and early winter is, however, becoming generally recognised.

The water is supplied by a public company drawing its supplies from a deep chalk well. It is of high organic purity,

but the company would be doing a public service if they adopted one of the well-known softening processes.

The town is drained on the Shone Pneumatic System. The sewage is delivered to the outfall works by three automatic ejectors, and is discharged into the mouth of Harwich Harbour during ebb tide. The system has proved very satisfactory. House refuse is removed daily during the summer months, weekly in the winter. A system of certification of lodging houses has been adopted by the Urban District Council, but has not been largely availed of.

The death rate for the year 1900 was 11·6. The mean rate for the last five years is 12·5. The population of Felixstowe and its adjoining parish, Walton, is 5,750. It is eighty-seven miles from London on the G.E.R.

Private enterprise has done a good deal more for Felixstowe than public. The chief public work for the convenience of visitors is the South Cliff Shelter, a well arranged though ugly building, erected at a cost of £2,000, provided with public rooms, lavatories, and sheltered garden. To private enterprise is due the well-known golf links, one of the best nine-hole courses in existence, famed for its beautiful lies, fine putting, and picturesque surroundings; a lawn tennis club with ten courts; a new cricket ground, which aims at "county" honours; croquet, bowling, and rifle clubs. Felixstowe is the headquarters of the Orwell Corinthian Yacht Club, and a first-rate yachting centre. To private enterprise is also due the Ranelagh Gardens, laid out on the model of a continental *Établissement*, for open-air entertainments, having a first rate orchestra, pavilion, croquet, tennis and bowling greens. A unique feature of Felixstowe is the bathing, carried out *en famille* from tents on the beach instead of the usual bathing machines.

#### SCARBOROUGH.

Humidity 83, rainfall 29. Cool (average 61·2 in summer); mild (average 41·4) in winter, or about 5° cooler than London in summer, and 5° warmer in winter. I have emphasised this last fact as unfortunately Scarborough is imagined by

some, particularly by Southerners, to be a cold, bleak place. This is quite the reverse of the truth, the late autumn and early winter are delightfully pleasant. Indeed, with the exception, perhaps, of the early spring, when the winds are rather boisterous for invalids, the climate may be described as delightful all the year round; dry, sunny, free from fog and conveniently adapted to the tubercular diathesis. Indeed, it probably will not be long before an open-air sanatorium is established in the neighbourhood. This would be particularly useful when some of those in the south are closed owing to the heat.

Amount of sunshine is very great; a recorder has recently been established.

The Spa waters are tonic and slightly laxative, well adapted for cases of rheumatism. They contain a large amount of calcium sulphate and are highly chalybeate.

Season: the very busy months are August and September, but many regular visitors stay on till Christmas or later—November in particular is often delightful.

Death rate 18·3; population 38,400; water supply excellent (Corporation); sewers good; sanitary certificates granted; refuse “destructured.”

The most striking recent public improvement is the new Marine Drive, which, when completed (£100,000), will connect the North and South Bays and form *par excellence* the finest sea-drive in England.

Holbeck and Clarence Gardens are provided with winding walks, shelters, and warm nooks. The former rank as among the most beautiful of their kind anywhere. St. Nicholas Gardens have recently been acquired and laid out at considerable cost.

*Amusements.*—The Spa (pronounced Spaw) must first be mentioned. It is picturesquely situated in the South Bay. During the season the band plays three times daily. At other times of the year are daily instrumental and vocal concerts. The firework displays by Brock are second only to those of the Crystal Palace; whilst the pretty theatre, forming part of the magnificent suite of buildings completed in 1880, is

occupied by a succession of first-rate companies. Tea at the Spa Café is a recognised institution.

There are two other theatres in the town. The North of England Lawn Tennis Tournaments are held in Scarborough annually. The beautiful ground, containing many tennis courts and full-sized croquet courts, is open to visitors for play at other times.

Every year there is a "cricket week," with visits from crack teams, on the famous ground on the north side.

Capital golf links at Ganton, twenty minutes by train.

Occasional races are held on the race-course, on an elevation about three miles from Scarborough. The view from the summit of the grand stand, both seawards and landwards, is probably the finest from any stand in England. At other times this ground is always available for a gallop. The volunteers camped here last year (over 5,000 men.) The writer will long remember the feeling of absolute vigour induced by tent life on this magnificent elevation.

During the winter there is excellent hunting, as three packs of hounds are within reach. If the meet is towards the moors a splendid gallop through the heather may be had, rivalling the scenery of the famous stag-hunting on Exmoor.

To pedestrians may be suggested such charmingly diversified walks as Forge Valley, the beautiful woods and drives through Lord Londesborough's grounds—Everley, Hackness, Scalby, Yedmendale, Troutdale, Deepdale—the great tracts of moorland towards Whitby, the sea road by Carnelian Bay to Filey, &c., &c. Oliver's Mount commands a bird's-eye view of Scarborough. This elevation, almost unique in its position, might be made much more use of. An electric railway to, and a tasteful laying out of the ground at the summit, and the provision of a good café there, are all improvements which no doubt will come in time.

This magnificent variety of its inland scenery marks out Scarborough from so many other watering places, the hinterland of which is so often barren.

## Notes and News.

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DR. JAMES NICOL, of Llandudno, a Foundation Fellow of this Society, died at Llandudno on February 20, aged 85. He was the author of a pamphlet describing the climate of Llandudno, a J.P. for his county, and a much respected member of the Profession.

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THE Fellows will sympathise deeply with Dr. W. S. Simpson, of Worthing, whose eldest son has recently died in South Africa after a short and brilliant career of two years in the Army, nineteen months of which time were spent in active service in the Boer war.

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THE death of Dr. James Myrtle, of Harrogate, after a short illness, has come as a great shock to many Fellows of the Society, and their sympathy with his family and with his father, Dr. Andrew Myrtle, who acted as the second President of the Society in 1896-7, is sincere and heartfelt.

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THE scene of the tour of the French health resorts is this year to be laid in the neighbourhood of Aix-les-Bains. The company will meet on Saturday, August 31, at Uriage, and business will commence the following day with an inspection of that place. On the Monday an excursion will be made to the Grande Chartreuse, the company returning to dine and sleep at Uriage. During the rest of that week the following places in order will be visited : La Motte, Allevard, Salins-Moutiers, Pralognan, Brides-les-Bains, and Challes. Aix-les-Bains will be reached on Saturday, September 7.

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AT Aix, as its importance demands, two whole days will be spent, both of which, however, will be partly occupied in visiting the sights in the immediate neighbourhood. One of these places, the Lake of Bourget, had a peculiar attraction for the late Queen Victoria. The tour continues on Monday 9, by way of the well-known Sanatorium d'Hauteville, to Divonne, Saint Gervais, Chamounix, Evian and Thonon. At Thonon, which is on Lake Geneva, the company will be dismissed on Thursday, September 12.

THE price to be paid for the tour is 300 francs (£12 10s.), and the price includes everything from the moment of arrival at Uriage on August 31, to the moment of departure from Thonon on September 12. Those who are taking part in the tour may, further, obtain a ticket at half price from any point in France to Uriage, and one on the same terms from Thonon back again. The organiser of the tour is Dr. Carron de la Carrière, 2, Rue Lincoln, Paris, to whom requests for membership should be addressed, accompanied by the money (in the form of an ordinary English cheque) so as to reach him not later than August 15. The list closes on that day and cannot be reopened.

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It is to be hoped that several of the Fellows of the Society will take the opportunity thus offered of spending a very profitable and withal a very inexpensive holiday in the beautiful scenery and bracing conditions to be found in the Alps. Judging by the experience of last year's tour in the Pyrenees, the Congress will be not only interesting and instructive in a high degree, but exceedingly enjoyable. We recommend all those who can afford the time, to embrace this opportunity of acquainting themselves personally with many places of which all have heard so much.

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THE energy shown by the French balneologists in bringing their resorts to the notice of the Profession both at home and abroad has excited the emulation of the Council of this Society. The question of the possibility of instituting some tours to the British stations was discussed at a recent meeting and the subject was referred to the consideration of a sub-committee. The report of this sub-committee is appended, and we invite those of the Fellows who are interested in the matter to send us any criticisms or suggestions that may occur to them.

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"By order of the Council, the following Report of the Sub-Committee appointed to consider the advisability of holding meetings at Health Resorts and of arranging a tour of medical practitioners to the Health Resorts of Great

Britain is now submitted for the consideration of all the members of the Council.

The Sub-Committee appointed to consider the question of tours for visiting the various health resorts has met, and begs to report as follows :—

“In the opinion of the Committee, it is desirable that arrangements for these tours be made as soon as possible, so that the first may take place next year, and that when the arrangements are completed they should be given every publicity in the Profession, both at home and abroad.

“The best times of the year would seem to be the end of April and the end of September. The former would probably best suit the arrangements of both metropolitan and provincial practitioners.

“It is considered desirable that the services of some gentleman of good professional standing, not specially connected with any of the health resorts to be visited, should be secured, who would accompany the Congress in order to act as its permanent Chairman, presiding at public dinners, &c., and delivering, if possible, short explanatory lectures at each place.

“It is also thought desirable that in each place the local authorities should be communicated with, and requested to provide facilities for the inspection and investigation of the town, its sanitary arrangements, and any special means of treatment which it may possess. The local Medical Society's co-operation and assistance should also be invoked.

“The country seems to divide itself naturally into districts suitable for the purpose of these tours, *e.g.*, S.W., N.E., Welsh, Scottish, &c.

“As the first tour would necessarily be to some extent experimental, it would be prudent to begin with a district readily accessible from London, and for this purpose the N.E., including Buxton, Matlock, Harrogate, and Scarborough suggests itself.

“ARTHUR P. LUFF,

“E. SOLLY,

“LEONARD WILLIAMS.”

# NAMES OF TOWNS WHERE FELLOWS RESIDE.

## ENGLAND.

ASHBY-DE-LA-ZOUCH. — Williams,  
Chas. R.

BARMOUTH.—Lloyd, Hugh J.

## BATH.

Bannatyne, Gilbert A.

Bayliss, R. A.

Begg, Chas.

Benson, John R.

Bowker, George.

Cowan, Frederick.

Ellis, W. McD.

Fraser, Forbes.

Kerr, J. G. Douglas.

King, Preston.

Lace, Frederick.

Lowe, T. Pagan.

Mackenzie, Alex. L.

Symons, W. H.

Walsh, Leslie H.

Wigmore, J.

Wohlmann, A.

## BEXHILL-ON-SEA.

Wills, Joseph P. B.

Joseph, A. H.

Murdoch, Andrew.

BIRCHINGTON.—Harris, James S.

## BIRMINGHAM.

Foster, Sir Walter (Hon.)

## BLACKPOOL.

Kingsbury, Geo. C.

Molloy, Leonard.

Rhodes, T.

## BOURNEMOUTH.

Alderson, F. H.

Gardner, T. F.

Gardner, Wm. Thomas.

Greves, E. Hyla.

Harsant, Joseph George.

Hosker, J.

Lys, Henry Crabham.

Mahomed, A. G. S.

Muspratt, Chas. Drummond.

Scott, Thos. B.

Snow, William V.

BRADFORD. — Campbell, Henry  
Johnstone.

## BRIGHTON.

Dodd, Walter H.

Furner, Willoughby.

Goff, Bruce E.

Griffin, Wm. Watson.

Hobhouse, Edmund.

Minter, Leonard J.

Noble, Stanley.

BOGNOR.—Rawlinson, Frederick J.

BRIXTON.—Elliott, George B.

BURGESS HILL.—Whitby, Chas.

BURNHAM. — Berry, Frederick  
Charles.

## BUXTON.

Armstrong, Wm.

Bennet, R. O. Gifford.

Bennet, Chas. J.

Braithwaite, John.

Lorimer, George.

Parker, R. Derident.

Thompson, G. H.

CAMBRIDGE. — Allbutt, Professor  
Clifford (Hon.).

CAISTOR-ON-SEA.—Case, William.

## CHELTENHAM.

Cardew, G. A.

Lawrence, H. Cripps.

Pruen, Septimus Tristram.

CLACTON-ON-SEA.—Nourse, C. M.  
Stuart.

- CLIFTON.—Clarke, J. Michell.
- CROMER.—Musgrave, C. B. Thos.
- CROWBOROUGH.—Newell, Percy.
- DEAL.—Lyddon, Richard.
- DEVONPORT.—Hall, O.
- DOVER.—Parsons, Charles.
- DROITWICH.  
Corbett, Thomas.  
Cuthbertson, J. M.  
Foulds, Francis Henry.  
Jones, H. Shirley.  
Roden, Percy A.  
Wilkinson, John.
- EASTBOURNE.  
Barnes, Robert.  
Daly, W. J.  
Frost, E.  
Habgood, Henry.  
Macqueen, Thomas.  
Plant, James Robert.
- EXETER.—Kempe, A.
- FALMOUTH.  
Bullmore, W. King.  
Knuthsen, L. F. M.  
\*Young, Major L. Tarleton.
- FELIXSTOWE.—Havell, C. G.
- FINCHLEY.—Bangay, Richard.
- FOLKESTONE.  
Barrett, W. P.  
Dodd, Percy.  
Eastes, Thomas.  
Larking, Arthur E.  
Latter, Cecil.  
Lewis, Percy George.  
Tyson, W. J.  
Wainwright, Lennox.
- FRIMLEY GREEN (Surrey).  
Haviland, Alfred.
- GORLESTON. — Gilmour, Graham  
Percy.
- GRANGE-OVER-SANDS.  
Beardsley, Amos.  
Beardsley, Richard Henry.  
Lowther, R.
- GREAT YARMOUTH.—Moxon, A. H.
- HARROGATE.  
Bain, William.  
Black, J. Gordon.  
Gibson, Charles.  
Hind, Harry.  
Hobson, Lewis John.  
Mouillot, F. A.  
Myrtle, Andrew S.  
Oliver, George.  
Ozanne, Frederick N.  
Smith, Francis W.  
Solly, Ernest.  
Walker, A. W. Hinsley.  
Watson, W. M. Crawford.  
Williams, Neville.
- HASLEMERE.—Hutchinson, Roger  
Jackson.
- HASTINGS.  
Allford, H. G. L.  
Inglis, John.  
Watson, George Trustram.
- HERNE BAY. — Bowes, Charles  
Keswick.
- HODDESDON.—Love, William.
- HOGSTHORPE.—Spilsbury, Francis  
James.
- HOYLAKE.—McAulay, Matthew.
- HYTHE (Kent).—Hackney, John.
- ILFORD.—Houchin, E. K.
- ILFRACOMBE.  
Gardner, J. Twiname.  
Toller, C. W. E.
- ILKLEY.  
Bampton, A. H.  
Bates, W. R.  
Johnstone, Thomas.
- LEAMINGTON.  
Atkinson, Miles H. C.  
Eardley-Wilmot, R.  
Thursfield, Thos. W.  
Wellesley-Garrett, A. S.  
Wyer, Otho.
- LEICESTER.  
Dodd, John.  
Pope, F. M.

LIMPLEY STOKE (Bath).—Drake,  
Thos. Geo.

LINCOLN.—Lowe, Geo. May.

LIVERPOOL. — Bickersteth,  
Edward Robert (Hon.).

LONDON.

Abraham, Phineas S.  
Achard, Alexander (Maryle-  
bone, W.).

Allen, W. Hamilton (Stanmore).

Ball, James Barry.

Baynes, Donald.

Bidwell, Leonard.

Blaker, Walter C.

Brown, F. Gordon.

Brown, George.

Bruce, J. Mitchell (Hon.).

Burnet, Robert William.

Campbell, Harry.

Cantlie, James.

Cathcart, George C.

Chaldecott, John Henry (Hamp-  
stead, N.W.).

Clarke, Ernest.

Clippingdale, S. D. (Kensing-  
ton).

Daniel, R. N. (S. Kensington).

Dockrell, Morgan.

Dodsworth, Frederick C. (Chis-  
wick).

Dowse, Thos. Stretch.

Ewart, William.

Fayrer, Sir Joseph, Bart. (Hon.).

Felkin, Robert William.

Forster, F. C.

Foster, Sir Walter (Hon.).

Fox, R. Fortescue (Winter).

Freyer, P. Johnston.

Gage-Brown, Charles Herbert  
(Belgravia, S.W.).

Garrod, Sir Alfred (Hon.).

Gordon, H. Laing (Honor Oak,  
S.E.).

Harbord, Augustus (Blooms-  
bury, W.C.).

Hawthorne, C. O.

Hedley, W. S.

Hill, G. W.

Hillyer, William H. (Streatham,  
S.W.).

Johnston, George F.

Jones, Montagu Handfield.

Keetley, C. R. B.

Kingscote, Ernest.

Knott, William (Oxford Circus,  
W.).

Lee, Robert (West Kensington).

Luff, Arthur Pearson.

Lyon, T. Glover (Victoria,  
S.W.).

Macfarlane, Alexander R. (Chel-  
sea, S.W.).

McCann, Frederick John.

McClure, Henry.

May, W. Page (May to Oct.).

Morison, Alexander.

Murray, J. Ivor.

Ord, W. Miller (Hon.).

Orwin, Arthur W.

Poore, Vivian (Hon.).

Pope, H. Campbell (Shepherd's  
Bush, W.).

Pope, Percy.

Powell, Sir Richard Douglas,  
Bart. (Hon.).

Pritchard, Owen.

Roberts, Francis H. (Forest  
Hill, S.E.).

Roberts, Frederick T.

Sansom, Arthur.

Scott, John Walter (Tulse Hill,  
S.W.).

Shaw-Mackenzie, J. A.

Sibley, W. Knowsley.

Sieveking, Sir Edward H.

Simpson, W. J. Ritchie.

Snake, Ernest.

Spicer, Scanes.

Startin, James.

Stephenson, Sydney.

Stiell, Gavin (Clapham Com-  
mon, S.W.).

Stivens, B. H. Lyne.

Stocker, W. Woodley (Willes-  
den Green, N.W.).

Sunderland, Septimus.

Thomas, Arthur W. (Wands-  
worth Common, S.W.).

Thompson, E. Symes.

Thomson, St. Clair.

Thorne-Thorne, Leslie.

Thorne, W. Bezly.

LONDON—*cont.*

Tubby, A. H.  
 Underhill, T. H. (Herne Hill, S.E.).  
 Walker, H. Roe.  
 Walters, F. Rufenacht.  
 Ward-Humphreys, G. H.  
 Weber, Fred Parkes.  
 Weber, Sir Hermann (Hon.).  
 White, Charles Percival.  
 Williams, Charles Theodore (Hon.).  
 Williams, Chisholm.  
 Williams, Leonard.  
 Woods, J. F.  
 Yeo, I. Burney (Hon.).  
 Younger, Edward George (Bloomsbury, W.C.).

LOUTH.—Gresswell, Albert.

LOWESTOFT.  
 Marshall, Augustine.

LYTHAM.—Merrall, H.

MABLETHORPE.—Iredale, J.

MALVERN.  
 Brockatt, Andrew A.  
 East, Charles Henry.  
 Fergusson, J. Campbell.  
 Haynes, Stanley.  
 Holbeche, Arthur Oliver.

MALVERN LINK.—Weir, Archibald Munday.

MANCHESTER.—Roberts, D. Lloyd (Hon.).

MARGATE.  
 Hemming, J. J.  
 Thomson, Robert.  
 White, Edward Alexander.

MATLOCK.  
 Moxon, William.  
 Sharpe, William Cecil.

NANTWICH.—Munro, Seymour.

NEWQUAY.—Hardwick, Arthur.

PAIGNTON.—Cosens, C. Hyde.

PARKSTONE.—Milner, Vincent.

PLYMOUTH.  
 Parsloe, Henry.  
 Pearse, William H.

POTTERS BAR.—Waddell, Arthur R.

## RAMSGATE.

Berry, John Bourne.  
 Tamplin, C. H.

RICKMANSWORTH.—Branthwaite, R. Welsh.

SCARBOROUGH.  
 Leigh, John Dickinson.  
 Snell, Sidney H.  
 Symes, Ernest.

SEAFORD.—Morgan, William Pringle.

SEVENOAKS.—Wagstaffe, William Warwick.

SHERINGHAM.—Sumpter, W. J. Ernley.

SIDMOUTH.  
 Leon, George A.  
 Mackindoe, Alexander.

SILLOTH.—Crerar, Charles.

SOUTHEND-ON-SEA.—Wade, C. H.

SOUTHPORT.—Pinkerton, Chas.

SOUTHWOLD.—Herbert, Alf. Corbyn.

ST. IVES.—Nicholls, J. Michael.

ST. LEONARDS-ON-SEA.  
 Bagshawe, Frederic.  
 Batterham, John W.  
 Brisley, Chas. W.  
 Brown, A. Hardwick.  
 Davis, W. H.  
 Inglis, Arthur Stephen.

ST. NEOTS.—Crosse, Edward J.

SURBITON (Surrey).  
 Merrick, Horace T. N.  
 Merrick, Robert Warren.

SWINDON.—Swinhoe, George Rodway.

TICEHURST.—Newington, H. Hayes.

TORQUAY.  
 Crowdy, F. D.  
 Cumming, G. W. Hamilton.  
 Eales, G. Y.

**TORQUAY—cont.**

Odell, William.  
Pollard, Reginald.

**TULSE HILL, S.W.**—Scott, John  
Walter.

**TUNBRIDGE WELLS.**

Bisshopp, F. R. B.  
Forbes, Norman H.  
Gilbert, E. G.  
Pardington, Geo. Lucas.  
Ranking, John E.  
Watson, Chas. Robert.  
Watson, Geo. S.

**WESTGATE-ON-SEA.** — Street,  
Alfred F.

**WEST KIRBY.**—Wilkinson, Percy  
J.

**WESTON-SUPER-MARE.**

Martin, Ed. Fuller.  
Rossiter, George F.

**WEYMOUTH.**

Browning, Benjamin.

**WOODHALL SPA.**

Cuffe, Edward Meade.  
Cuffe, Robert.  
Williams, Cyril John.

**WORTHING.**—Simpson, W. S.

**ISLE OF WIGHT.**

**CARISBROOKE.**—Groves, Joseph.

**SANDOWN.**—Brodie, F. Cardew.

**TOTLAND BAY.**—Hands, Chas. H.

**WALES.**

**ABERDOVEY.** — Bonner, Thos.  
Irvine.

**ABERYSTWITH.**

Thomas, Abraham.

**BURRY PORT.**—Williams, Owen.

**CAERGWILE.**—Johnston, W. A.

**LLANDRINDOD WELLS.**

Davies, W. Bowen.  
Evans, John Morgan.  
Greenway, Alfred G.  
\*Macfie, Ronald Campbell.

**LLANGAMMARCH WELLS.**

Jones, Wm. Black.

**PENMAENMAWR.**—Williams, John  
Robert.

**PORT TALBOT.**—Davies, J. H.

**SCOTLAND.**

**BRIDGE OF ALLAN.**

\*Fraser, John Hosack.  
Haldane, William.

**CALLANDER.**—McLaren, Hugh.

**CRIEFF.**—Thom, Alexander.

**DUNKELD.**—Taylor, James A.

**EDINBURGH.**

Affleck, Jas. O.  
Brown, J. Murdoch.  
Croom, J. Halliday.  
Grey, Harry (for letters in  
summer).  
James, Alex.  
Muirhead, Claude.  
Russell, Wm.  
Watson, D. Chalmers.

**GLASGOW.**—Alexander, John.

**GOLSPIE.**—Simpson, J. B.

**MOFFAT.**—Huskie, David.

**NAIRN.**

Cruikshank, Brodie.  
Sclanders, Alex.

**OBAN.**—McCalmen, Dove.

**ROTHESAY.**—Marshall, J. N.

**STRATHPEFFER.**

Bruce, William.  
Duncan, E. H.  
Fox, R. Fortescue (Summer).  
Fox, J. Tregelles.

**ST. ANDREWS.**—Huntington, Wm.

**IRELAND.**

**BELFAST.**—Byers, Prof. John W.  
(Hon.).

**BUNDORAN.**—Creighton, Robt. H.

DONEGAL.—Warnock, Hugh Thos.

DUBLIN.

Banks, Sir John (Hon.).

Little, James.

LISDOONVARNA.—Westropp, W.  
Stackpoole.

QUEENSTOWN.—Townsend, R. H.

ST. ANN'S HILL.

Bennett, Arthur Geo.

VALENCIA ISLAND.—Letters,  
Patrick.

#### ISLE OF MAN.

DOUGLAS.—Mackenzie, Thomas.

RAMSEY.—Tellett, Frederick.

#### CHANNEL ISLANDS.

ALDERNEY.—Livesay, Edgar Wm.

GUERNSEY.

Dunkley, Wm. Wilberforce.

#### FELLOWS RESIDING ABROAD.

AIKEN (S. Carolina).—McGahan,  
Chas. F.

AIX-LES-BAINS.

Forestier, Henri.

Rendall, Stanley Morton (in  
Summer).

ARMIDALE (N. S. Wales).—Little,  
Joseph Henry.

ASSOUAN (Egypt).—Canney, H.  
E. Leigh.

BADEN-BADEN (Germany).

Gilbert, W. H.

BORDIGHERA (Italy). — Danvers,  
Herbert.

CAIRO (Egypt). — Sandwith,  
Flemming Mant.

CANNES.

Macdougall, J. Aymers.

Sanders, Gordon.

CAPE COLONY.

Daniel, G. W. B.

Guillemard, B. J.

CAPE TOWN.—Scholtz, Wm. C.

DURBAN (Natal).

Birtwell, Daniel.

Prince, J. Perrott.

GIBRALTAR.—Turner, William.

HELOUAN (Egypt).—May, William  
Page (November to April).

LAUSANNE (Switzerland).—Harpe,  
Eugene de la (Corr.).

MADEIRA. — Krohn, Ronald  
Edward Stewart.

MAGGIORE. — Grey, Harry (in  
Spring and Autumn).

MENTONE.

Rendall, Stanley Morton (in  
Winter).

Campbell, J. William.

MONT CARLO.

Fagge, T. H.

Mitchell, R. Pryce.

Rouse, Rolla.

Sim, Roderick.

MONTREUX (Switzerland).—Wise,  
Alfred Thos. Tucker.

NAPLES (Italy). — Gairdner,  
Matthew Wm.

NEUENAUH (Germany).—Grübe,  
Karl (Corr.).

NICE (France).

Amy, George.

Gilchrist, Alexander Wm.

ODTSHOORN (South Africa).

Russell, George.

PYRMONT (Germany).—Marcus,  
Sigismund, Ph. (Summer).

SAN REMO (Italy).

Foster, Geo. Michael.

Grey, Harry (in Winter).

Marcus, Sigismund, Ph. (Win-  
ter).

ST. MORITZ (Switzerland).

Holland, James Frank.

VICTORIA (Australia). — Naylor,  
Rupert Geo.

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THE MINERAL WATERS OF CALEDON, SOUTH  
AFRICA.

BY W. G. DANIELL, M.R.C.S.Eng., L.R.C.P.Lond.

*Medical Superintendent to the Caledon Mineral Baths Sanatorium and Medical Officer  
of Health to the Caledon Municipality, &c., &c.*

THE NATURE OF THE CALEDON MINERAL WATERS.

THERE are quite a number of mineral springs, of more or less medicinal value, scattered all over South Africa, *e.g.*, those of Malmesbury, Montague, Aliwal North and Waterberg (in the Transvaal). I have chosen the Caledon mineral waters for description, not only because I can speak of them from direct observation extending over a number of years, but also for the reason that the facilities for the various uses of them in the bathing establishment more nearly approach the more modern idea as seen in Europe than any of the others at the time of writing this paper.

Two analyses of the Caledon waters have been taken, one by Professor Hahn of the South African College, Cape Town, and one by Professor Attfield, F.R.S., of London.

Professor Hahn's analysis and report is as follows :—

						Grains.
Ferrous carbonate	...	...	...	...	...	2'10
Sodic sulphate	...	...	...	...	...	'852
Common salt	...	...	...	...	...	4'027
Silica	...	...	...	...	...	1'802
Alumina	...	...	...	...	...	'756
Calcic sulphate	...	...	...	...	...	1'624
Calcic carbonate	...	...	...	...	...	Trace
Magnesian sulphate	...	...	...	...	...	1'054
Total grains per gallon.						<u>12'225</u>

"It will be seen from this that the chief and most valuable constituent is ferrous carbonate,  $\text{FeCO}_3$ , which is present in the water as bicarbonate (hydric ferrous carbonate,  $\text{H}_2\text{FeC}_2\text{O}_6$ ) ; this, on exposure to the air, absorbs oxygen and parts with carbonic acid ( $\text{CO}_2$ ), and forms the yellowish-brown insoluble basic ferric carbonate,  $\text{Fe}_3\text{O}_3(\text{CO}_2)_2$ , thus  $\text{H}_2\text{FeC}_2\text{O}_6 + \text{O} = \text{Fe}_2\text{O}_2(\text{CO}_2)_2 + 2 \text{H}_2\text{O} + 2 \text{CO}_2$ .

"Now when the water is freely used, or bottled in such a way as to exclude all air, and so prevent it parting with its carbonic acid ( $\text{CO}_2$ ) and absorbing oxygen, it contains the iron in a condition in which it is most readily assimilated by the system, and in which the physician is very anxious to prescribe it, but generally finds a difficulty, as the ferrous compounds have such a tendency to turn ferric.

"The temperature of the water is  $120^\circ \text{F}$ . We know of no chalybeate spring which has yet been analysed which has a temperature so high as that of the Caledon waters. This warmth is very useful, as, in drinking, many chlorotic patients do not bear cold, carbonated drinks well, and they have consequently to be warmed before administration.

"Iron being the sheet anchor for the treatment of most blood dyscrasiæ, we have a large field for the employment of Caledon waters, as most chronic and depressing diseases leave the blood impoverished. In rheumatic conditions we find these waters very efficacious, as by internal administration we supply a valuable tonic, and by bathing the carbonic acid in the warm waters has a stimulating effect on the skin and other parts.

“Rohrig, Krause, and others have fully demonstrated that the skin has no power of absorbing iron, and we can only attribute the marvellous beneficial effect experienced in the use of the Caledon thermal waters to the stimulating effect of carbonic acid and the tonic supplied to the system by the internal administration of an iron compound easily assimilable and not producing gastric and other disturbances.

“The greater value of the Caledon Spring consists in the fact that it contains a large amount of ferrous carbonate, or more correctly of ferrous dicarbonate in solution. This amount of ferrous dicarbonate is as large as it possibly can be at the high temperature at which the water issues from the eye of the spring. As soon as the water comes in contact with the oxygen of the air a series of chemical changes take place, which finally result in the formation of hard solid hydrated ferric oxide, which is simply the brown iron ore, of which the hill is practically composed, on which the spring is situated. As soon as the ferrous dicarbonate meets the oxygen of the air basic ferric carbonate is formed, which partly forms a film of metallic lustre where the water is stagnant, or settles as a very amorphous yellow sediment where the water is in motion. This basic ferric carbonate gradually exchanges the carbonic dioxide which it contains with water, and passes into the hydrated ferric oxide, and this being at first a soft brown mass finally consolidates, forming the brown iron ore.

“In order to retain the soluble ferrous dicarbonate in the particular chemical combination—in which it is most digestible and very suitable for the weakest constitution—in the water, it is absolutely necessary to prevent the water from coming into contact with the air when it is bottled. If this be done the ferrous dicarbonate remains in solution for any length of time, and there is never a sediment formed in the water as long as it is kept out of contact with the air.

“In January, 1886, I proceeded to Caledon to fill about fifteen dozen bottles with this water for the Colonial and Indian Exhibition. Great care was taken in excluding the air in the process of filling. The water in the bottles was clear and remained clear ; no sediment whatever was formed.

About eighteen months later I opened some of the bottles which I had kept and had placed at a spot where they had always been exposed to sunlight. I then found the water of exactly the same composition which I had at the time of bottling. It was most interesting to observe that after eighteen months the water, on exposure to the air, soon formed a sediment, again undergoing the same changes which can be observed when the water is taken fresh from the spring and exposed to the air.

"Irrespective of its medicinal qualities, the water is a most valuable table water when bottled in the proper way. I have no doubt that this water, when properly bottled, will be used all over South Africa in place of many mineral waters which are now imported, and are much inferior as to the quality and quantity of their ingredients to the water of the Thermal Chalybeate Spring of Caledon.

"(Signed) P. DANIEL HAHN, Ph.D., M.A."

Professor Attfeld's analysis and report is as follows.

"One imperial British gallon of this water contains:—

						Grains.
Potassium chloride ...	...	...	...	...	...	2'8148
Sodium chloride ...	...	...	...	...	...	1'7448
Calcium sulphate ...	...	...	...	...	...	1'3140
Calcium carbonate ...	...	...	...	...	...	'2097
Magnesium chloride...	...	...	...	...	...	'2674
Magnesium carbonate	...	...	...	...	...	'5764
Ferrous carbonate ...	...	...	...	...	...	1'9302
Alumina ...	...	...	...	...	...	1'1100
Silica ...	...	...	...	...	...	2'2220
Total grains per gallon...						<u>12'1893</u>

"The three leading features of this water are, first, its high temperature as it springs from the ground, certified to be 120° F.; secondly, the presence of iron in solution; thirdly, its great purity as regards freedom from organic matter, and from undesirable kinds of mineral matter, or undesirable amounts of inorganic matter. The temperature will fall a little after the water is drawn from the springs, and then will be as high as can be borne in drinking or bathing. From the presence of a little ferruginous sediment in the sample of the

water that reached the writer in London several weeks after it was drawn, and after the violent shaking necessarily undergone in transit, the proportion of ferrous carbonate at the springs must be between two and three grains per gallon. This is as much as can be borne by most persons without discomfort on the palate. As to purity, after the iron had been deposited by exposure of the water to the air, the water compared favourably with the best and most popular table waters.

*"Analytical Data.*—Grains and decimal parts of a grain per gallon : potassium, 1·4735 ; sodium, 0·6860 ; calcium, 0·4703 ; magnesium, 0·2322 ; iron (Fe), 0·9318 ; alumina ( $\text{Al}_2\text{O}_3$ ), 1,1100 ; silica ( $\text{SiO}_2$ ), 2·2220 ; radical of sulphates ( $\text{So}_4$ ), 0·9276 ; radical of chlorides (Cl), 2·6000 ; radical of carbonates, 1·5359 ; total, 12·5893. These substances, and proportions of substances present in the water, are almost identical, as regards most of the materials, with those previously published. In the water these substances are combined and form compounds. An analyst has to use his judgment as to the manner in which the substances are naturally coupled. Hence, while different analysts' data do not materially differ, the tables of composition of the compounds may appear to differ. As to the absence of organic impurities the datum of albuminoid ammonia per million parts is only 0·02 of one part. This is indicative of a high degree of organic purity. Nitrates absent. The water is well aerated, the ferrous carbonate obviously being kept in solution in the water by the aid of the dissolved carbonic acid gas that is naturally present.

*"(Signed) JOHN ATTFIELD."*

The water when drawn from the springs, or taken from the taps in the sanatorium, is clear, sparkling, and colourless. The sparkling appearance is due to the presence of carbonic acid gas. In large quantities the water is of a slightly brownish tint, due no doubt to a small quantity of free carbonate and oxide of iron.

The water is free from odour, and possesses a peculiar chalybeate taste. The water used for bathing is brought down in carefully closed earthenware pipes, so constructed that no

air can have access to it, thus preventing any chemical changes on its way down. There is only a slight loss of temperature in the water on the passage down.

Before considering the medicinal uses of the Caledon mineral waters I would observe that it is not *entirely* owing to the presence of one particular mineral ingredient in a spring (except when it is found in very large proportions) that its efficacy is to be attributed, or on which its selection as a medicinal agent will depend. It is to the union of the several substances contained in the water, the temperature, and the quality of the fluid with which they are combined, and still more to the recorded experience and concurrent testimony of credible witnesses, that reference must be made for instruction and guidance in the choice and employment of a mineral spring.

#### MEDICINAL USES OF THE WATERS.

We see at once that ferrous carbonate is the element of chief therapeutic value, as far as chemical analysis can show. I shall not attempt to draw a hard and fast line between those who are benefited by bathing alone, and those who are benefited by drinking of the water only. Speaking generally, the majority of affections more rapidly improve and more permanently recover when the bathing is accompanied by the internal administration of the waters. We know that ferrous carbonate is the best form in which to administer iron (except in cases in which its astringent properties are especially indicated), inasmuch as it is more readily absorbed, and on account of it being less astringent, and therefore less liable to derange the digestive organs or to produce constipation. We note too that it is combined with salts, which not only to a small extent correct the *extremely slight* constipating effects, but also, as has been proved, assist in the assimilation of the iron. Another valuable ingredient is the carbonic acid gas, by which the ferrous carbonate is held in solution, the action of which, besides assisting digestion, makes it more palatable and pleasing to the eye ; it is also a useful stimulant to the nervous system ; it helps to restore

pliability to stiffened limbs, and it alleviates certain forms of paralysis by reflex stimulation of the nerve terminals. Dr. Ringer, in his *Handbook of Therapeutics*, says :—"Carbonic acid gas is generally employed dissolved in water—natural waters containing a large quantity of carbonic acid are used externally in chronic gout, chronic rheumatism, and many chronic affections. Carbonic acid is an excitant to the skin, producing tingling, redness, a sensation of warmth, and increasing the flow of perspiration ; but after a time the gas acts in some measure as an anæsthetic, lessening the sensibility of the skin and removing or diminishing pain. Carbonic acid water is employed in painful and irritable conditions of the stomach. It eases pain and checks vomiting." Undoubtedly the Caledon waters have proved themselves to possess these properties. The drinking of a tumblerful or more of this clear and sparkling water, as it issues from the fountain heads, especially if taken every morning before breakfast, is known to be of great benefit in chronic constipation and dyspepsia, and for reasons given before is retained on the stomach without any feeling of discomfort or heaviness. As already stated, the mineral waters of Caledon contain more than four times the quantity of iron than any others, yet this quantity of ferrous carbonate is in a measure largely diluted. It has been questioned by those who have examined the analysis of the waters as to how it is possible that waters having so comparatively small a quantity of iron can do any good. The answer is that experience has proved them to be of great value. It is not the iron alone. "Chemistry cannot accurately point out by analysis the varied administration and uses of mineral waters. Analysis invariably disturbs the grouping of affinities, and the loss of gases, by evaporation for instance, certainly affects the fixed constituents of various highly-charged mineral waters. It becomes therefore in practice a question of the difference of clinical analyses." Iron may be looked upon as a food, seeing that it is a necessary constituent of the body, and I do not hesitate to say that these waters should be more widely and generally used, not only as a medicine, but also as a pure, sparkling

and refreshing table water that can be retained by the stomach without heaviness or nausea. The explanation of the wonderfully rapid improvement in anæmia by the drinking of waters is in all probability found in the generally admitted assumption—though I know that there are some who do not quite agree—that only the iron which is absorbed and actually enters the blood is of any service in the treatment of anæmia, and it has been further found by experience that the free dilution of the iron is in itself a great advantage, as it is much more easily absorbed. Dr. J. M. Fothergill in his “Handbook of Treatment,” in the chapter on anæmia, says : “The indications for treatment furnished by anæmia, are varied and important. It is obvious enough that the measures indicated are those which tend to restore the condition of the blood to the normal. The blood must be built up by an increase in the foundation of blood-corpuscles. Not uncommonly the anæmia will assume a phase of the most obstinate persistency, and defy the best laid schemes of the medical adviser. Under these circumstances a residence at a *chalybeate spring* is certainly indicated. . . . The amount of the dilution is a matter of the greatest moment in attempting to bring the system under the influence of chalybeates in many cases. This fact alone makes the difference betwixt failure at home and success at a spa.” Again he writes : “One great matter—perhaps the greatest of all with mineral waters—is their dilution. The different substances are largely diluted with water, and are thus more readily assimilable than when given from the medicine bottle.”

From what has been already said on the composition of the waters it will appear at once that they as nearly approach a perfect chalybeate water as possible, and for the following reasons :—

First, from their non-astringent and non-irritating qualities.

Secondly, from their free dilution, encouraging absorption.

Thirdly, from the presence of carbonic acid gas, acting as a sedative to the gastric mucous membrane, and a stimulant to the skin.

Fourthly, from the proportion of contained saline constituents, rendering absorption more easy.

Fifthly, from their high temperature.

It is necessary to add that although some persons have used the waters with seeming recklessness without experiencing injurious effects, it does not follow that it is at all wise to incur any risk when it may be avoided by the observance of rules accumulated by long experience and close observation.

The waters when drunk fresh from the spring cause a rise and acceleration of the pulse, increase the temperature of the body, and excite the secretions ; they cause a comfortable glow of warmth to the stomach, increase the appetite, and act as an agreeable and healthy stimulant to the stomach and the internal organs. When the waters are used to bathe in, there is sometimes on first entering the water a slight shock, which is quickly followed by a grateful sensation of warmth. The pulse is increased in frequency, the temperature of the body is raised, the flow of urine is increased, the skin—being acted upon by the *stimulating* diaphoretic action of the water—acts freely, but the depression and languor which often follow the use of ordinary warm water baths rarely, if ever, are seen. In the case of the weak and feeble, in whom functional activity is low and there is no reaction to *cold* stimulation, the warm bath is not only a stimulant, but supplying heat, adds to the vital powers, improves the circulation, and reflexly—through the nervous system—improves the tone of the muscles and internal organs. In those suffering from rheumatism or other painful affections the pain is often relieved at once, and although the stiffness as well as the pain may return shortly after leaving the bath, yet by the continuation of bathing recurrence of both gradually ceases. The steam from the water, especially if inhaled when using the needle bath, has proved to be beneficial in chronic bronchial and laryngeal diseases.

It will appear, then, that these waters are invaluable, as has been fully proved by experience in a great variety of morbid conditions, amongst the chief of which may be enumerated : (1) anæmia, chlorosis, malarial cachexia, convalescence from acute diseases of any kind ; (2) scrofula ; (3) rheumatism ; (4) gout and rheumatic gout ; (5) neuralgia, sciatica, chorea,

hysteria, &c. ; (6) Bright's disease ; (7) diseases of women ; (8) chronic diarrhoea ; (9) skin diseases ; (10) certain diseases of the respiratory tract ; (11) liver diseases ; (12) surgical diseases, &c.

I shall have a few remarks to make on each, acquired by observation and actual practice during my engagement as medical attendant to the baths during a period of ten years.

In anæmia it is admitted that iron (1) remedies the deficiency in the colouring matter of the blood, and also (2) increases the number of the blood corpuscles, and thus acts as a natural means of conveying nutritious matter to all the organs of the body, thereby relieving palpitation of the heart, shortness of breath, amenorrhœa, and in fact all the results of anæmia. I have often seen all these symptoms disappear from the judicious drinking of the waters, and a return of colour to the cheeks, improvement in the appetite and digestion, and complete restoration to health.

In chlorosis the rational remedy is to feed the blood with a suitable ferruginous tonic, and therefore a course of these waters will warrant a good prognosis to patients using them. It is found that patients can take a good quantity of water without feeling any inconvenience ; even those cases of anæmia troubled with dyspepsia can take the waters in large quantities with the gratifying result of a disappearance of the gastric symptoms and a rapid restoration of the blood to its normal condition. Anæmia, wasting of the body, cachexia, the result of exposure to malarial conditions or the result of a long residence in a tropical climate, is generally benefited by a course of the waters. A glass of the hot chalybeate water should be taken before breakfast on an empty stomach. Besides acting as a tonic, it plays the part of a diluent and assists biliary flow.

In invalids from malarial districts arriving in Caledon with the characteristic anæmia and wasting due to repeated attacks of malarial fever, the result of bathing in and drinking the waters, combined with the change to a healthy climate, is highly satisfactory. The anæmia and debility arising from protracted illnesses, such as diphtheria, typhoid, &c., and

functional disorders proceeding from mental worry, &c., will find great benefit from the use of the waters combined with ordinary hygienic measures.

Bathing in the waters under competent guidance is a great help in alleviating nervous manifestations consequent to impoverished blood, such as headache, neuralgia (intercostal and facial), hysteria, sleeplessness ; for these the full sedative action of the waters is invaluable.

The chalybeate springs of Europe are thronged by the victims of scrofula, and the mild iron waters of Caledon are specially good in this diathesis, in connection with suitable hygienic measures.

In a country like South Africa, where rheumatism is so widely prevalent, it is natural that the value of the Caledon waters for this disease should have been well tested. I have seen and had under actual treatment and observation patients from England and the Continent, Cape Colony, Natal, Orange River Colony and the Transvaal. It is little less than wonderful to see how quickly, and in the majority of cases how completely the baths act. Patients who have been for years completely crippled from rheumatism, and consequently impaired in health and depressed in mind, have recovered perfectly.

Dr. A. G. Viljoen, formerly medical attendant to the baths, writes : "The composition of the water is so remarkable that its analysis has only to be known to scientific men to class it amongst the world's wonders. It is certainly unique, inasmuch as it is *the only* hot chalybeate spring containing the quantity of ferrous carbonate and having the same high temperature. During my occupation of the District Surgeoncy at Caledon—a period of about eight years—I was frequently consulted by patients at the Spa, and as I took a keen interest in balneo-therapeutics, I made the baths a special study, and consider it my duty to state my entire satisfaction, surpassing at times my most sanguine expectations, of the efficacy of the waters in rheumatic and allied conditions, most forms of nervous prostration, and convalescence from acute diseases, and a variety of those disordered conditions which

often make life insufferable to women. The efficacy of the waters in the diseases enumerated above, together with others in which iron in its most assimilable form is indicated, has only to be brought to the attention of medical men to be at once appreciated."

#### ACTION OF THE WATERS.

Now it may be asked, what are the causes and means by which these cures are effected ?

I would reply that there are, in all probability, a number of causes acting in unison.

In the treatment of rheumatism in its more chronic aspects mineral waters, with appropriate adjuncts, are at present our mainstay. Whatever the causes of chronic rheumatism, whether it be the result of an acute attack, climate, or exposure, there is no doubt that warmth and free perspiration are two of our most potent means in treatment. It is observed that the class of rheumatic sufferers most obstinate to medical treatment are those suffering from inaction of the skin. As mentioned before, the waters have been found, in the generality of cases, to act with more certainty than diaphoretic drugs, and also (which is very important) with less interference to the action of any other medicines that may be given. I will not touch on the mechanical and other effects produced by forcible impaction on the skin by any such means as douches, sprays, needle baths, &c.

Many patients, especially those suffering from lumbago and other muscular rheumatism, are relieved a few minutes after entering the water, and are permanently cured by a systematic course of baths. The internal use of the waters is also valuable here on account of the anæmia and general weakness which often accompany chronic rheumatism.

It is not to be assumed that because a patient has disease of the heart he is debarred from using the Caledon waters ; on the contrary, many cases with mitral and other cardiac murmurs do well, especially if there is compensation, and the other internal organs are in a healthy state. I have observed complete disappearance of morbid cardiac sounds

in rheumatic and other patients whilst using the waters. Of course there are exceptional cases of cardiac disease that should not bathe in the waters, but experience has proved that many cases that at first appeared doubtful, have with due caution been successfully treated by baths.

In the treatment of all the varieties of chronic joint troubles, especially those stiffened by the results of chronic inflammatory infiltration, the waters, with massage, are of value.

Of the use and value of the waters in gout or lithiasis there is much to say. I can speak from very extensive experience. The free drinking of the waters is simply invaluable on account of the free dilution of the constituents, and from the flushing of the kidneys. Whether the waters possess a real diuretic action I am not prepared to state; but it has been shown in the case of other waters that the excretion of urea is augmented beyond that which can be explained by the increased absorption of fluid enlarging facilities of urinary secretion. *A priori* we should expect (and it is fully borne out by clinical observations) that gouty subjects do wonderfully well. The sulphates contained in this mineral water no doubt tend to diminish the uric acid in the system. Also, by bathing in the thermal water of a high temperature, the skin is encouraged to act freely, and the warmth alone assists in the conversion of urea into uric acid and carbonic acid gas, which is supposed to occur in the inflammatory stage of an attack of gout. The relief experienced at once by such sufferers on the application of local or general warmth by any means is well known. I would not be misunderstood in my cursory remarks on treatment by means of these waters. I do not for one moment wish to imply that they are so miraculous in their action as to exclude all other valuable and often essential remedies in the way of drugs; *that* would be far from the object of this paper. It would be an impertinence on my part to remind my readers of all the drugs which would at once suggest themselves as valuable adjuncts to the waters in the treatment of all diseases touched on in this paper. The tonic action of the waters has shown their value, especially in those

cases of physical and mental depression appearing in what is called "poor man's gout," and in patients crippled and consequently weakened from want of the tonic and invigorating effects of fresh air and exercise.

Every medical practitioner is aware that nervous exhaustion is a fertile cause of a recurrence of gout. In all those morbid phenomena which are classed as "irregular" gout, such as eczema and other skin diseases, vertigo, dyspepsia, &c., I have found the following treatment of benefit: bathing in the waters to encourage free perspiration and a healthy action of the skin; careful regulation of the diet, and—in the generality of cases—the avoidance of alcohol, especially wines in which the fermentation has been prematurely checked; a judicious amount of exercise, sometimes combined with massage, and galvanism; and finally, the free drinking of the waters, which I often combine in the morning with some saline mineral water, such as Carlsbad, or Apenta, if the liver be inactive.

Amongst nervous diseases benefited by the waters many may be mentioned—chorea, hysteria, facial paralysis, diphtheritic paralysis, locomotor ataxy, and the paralysis of lead poisoning, &c. Space does not permit my going into each of these diseases. I will, however, mention one, viz., chorea, which, when of rheumatic origin, is most satisfactorily treated with the needle bath, combined with mild Faradism, each jet of water carrying an electric current. It is difficult to speak with certainty, but my impression of cases of chorea treated by this method, combined with absolute rest and good food, is that they do better than by the ordinary treatment. The anæmia is often quickly relieved by drinking the chalybeate water, and the rheumatism by a further course of bathing in the usual way. All that can be said about locomotor ataxy is that, for a time at least, the pain is relieved, but not in all cases.

In diseases of women I have not a few interesting and successful cases on record. The bathing in the waters by one method or another is highly efficacious in cases of dysmenorrhœa and amenorrhœa (especially if due to anæmia or chlorosis,

in which cases the drinking of the waters should be encouraged). The baths are also much frequented by those suffering from leucorrhœa, chronic ovaritis, and in many of the complications following childbirth.

In all cases in which high arterial tension has to be reduced or avoided, the relaxing and diaphoretic effects of the baths are of great value. In Bright's disease, where we see the ill-effects on the circulation of the retention and accumulation of nitrogenous waste, the cleaning of the kidneys by the free diuresis (their work being also lightened by the action of the skin), together with the tonic properties of the iron waters, form one of the most valuable aids in treatment. Those who have not had under actual observation cases of renal disease whilst using the waters would hardly credit the astonishing rapidity with which the symptoms disappear. I have observed with astonishment and delight the rapid decrease of œdema, relief from headache, vertigo, &c., and especially the softening of the pulse and disappearance of palpitation. The valuable action of the skin when free perspiration is produced has shown itself in the formation on its surface of crystals of uric acid.

I have in no single instance seen the waters disagree in any way whatever, even when taken in large quantities, not even in anæmia, gout or rheumatism, in which, as is well known, attacks of dyspepsia are so common. I have touched on the advantages of the waters in the neuralgia of anæmia, and I would but briefly add that in most other neuralgic affections especially due to rheumatism, as sciatica, &c., the remarkable disappearance of the pain can only be due to their tonic effect. I have further to report some very interesting cases of chronic diarrhœa of a dysenteric nature which were cured after other medical treatment had failed.

In cutaneous diseases I have seen chronic eczema, especially of a gouty or rheumatic origin, greatly relieved, and often cured, by the use of the waters. The sedative action of the carbonic acid gas in the water allays the itching and irritation. Hebra's method of treating patients with chronic psoriasis and lepra by long immersion in tepid water, may be followed with advantage in these waters.

I have mentioned before bronchitis and catarrhal conditions of the respiratory tracts in connection with the waters, but omitted to mention the rapid recovery in the latter conditions following influenza. This may be in part due to the high and healthy position of the sanatorium. In phthisis, as would be supposed, the waters have no specific value, but as an aid to the dyspepsia, and as a tonic, they are of great service.

In many affections of the liver, such as chronic congestion following too free living, alcoholic excess, exposure to malarial influences, or a too long residence in a tropical or sub-tropical climate, also in many merely functional disorders, much benefit is derived from a course of baths at Caledon. The healthy, bracing climate, which is never too hot, the high altitude of the sanatorium, together with the liberal drinking of the waters—assisted by suitable drugs and bathing—is a most desirable combination of treatment.

I have not overlooked in my list of morbid conditions those which are of a surgical nature, including fibroid exudations around the joints, and consequent stiffening and partial ankylosis following sprains, fractures, dislocations. Such cases as these require massage and the local action of the hot mineral water, together with the combined electrical current (galvano-faradisation). In chronic oedematous conditions of the limbs, following fractures and other injuries, and sometimes after surgical operations, especially if there is at the same time gout, anæmia, or some disease of the internal organs, also in chronic synovitis, the Caledon mineral waters are known to act wonderfully, and the treatment should be combined with local measures. Quite recently a case of chronic vesical catarrh was cured by no other treatment than a very free drinking of the waters, and bathing. This case suggests an extension of the same treatment to such cases as result from stricture or enlarged prostate.

The waters have been shown by experience to operate favourably in a number of other diseases besides those enumerated. In all probability they possess an alterative action which is difficult to explain or understand.

In conclusion, I must just allude to two important aids and adjuncts, viz., massage and electricity.

In stiffened joints of old or recent standing, stiffened by extra- or intra-articular fibrous tissue as the result of injury, gout, rheumatism, &c., massage, if necessary, combined with the constant or interrupted current, is of priceless value. I have come across a number of patients who have submitted themselves to massage and electrical treatment without success, who have completely recovered when the same treatment has been combined with the use of the waters. This combined treatment—baths, massage and electricity—is highly beneficial in subjects of enfeebled circulation, as in anæmia, nervous exhaustion, and in other conditions in which it is considered by the patient's physician that it is inadvisable to take exercise as likely to lead to further exhaustion.

It is therefore hardly a matter of wonder that massage and electricity are so successful in their results when assisted by water of such great curative properties. We must not leave this subject without mentioning the indirect good which pleasant society, regular living, rest, outdoor exercise, simple but nourishing food, a limitation of alcoholic beverage, in fact, all habits and conditions of living arranged with the exclusive object of restoring body and mind to that healthy standard of health and vigour from which it has fallen.

Beyond all doubt the Caledon waters have a high reputation, but no greater mistake can be made than to imagine that they will cure all and every complaint; no waters have the property of curing all diseases. The reader will be able very easily to fill in the list of diseases in which mineral water treatment of any kind is contra-indicated, such as cancer, advanced aortic diseases, aneurism, acute inflammatory diseases, &c.

As no two cases of any disease are exactly alike, no hard and fast rules of diet or treatment can be laid down, so that diet, bathing and other treatment must depend on the individual condition of the patient and the nature of the case. Any notes of former, and suggestions for present or future treatment, together with the private opinion of the case from the family medical attendant, is always held of the greatest value and importance.

## NERVOUS DISEASES OF RHEUMATIC ORIGIN.—I.

BY LEONARD WILLIAMS, M.D.

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So long as the nature of rheumatism remains unknown, so long will the title "rheumatic" remain the milch-cow of those who are content with the obvious in causation. Reference to text-books of no very ancient date will reveal the strange fact that rheumatism and chill (which latter is often spoken of as if it were the positive of that entity whose superlative is rheumatism) are held responsible for any and every complaint for which no more definite cause can be assigned. The decline in the popularity of rheumatism as an exciting cause which the last few years has witnessed is in direct ratio with the displacement of former chaos by definite knowledge, and the time is probably at hand when even the position of predisposing or contributory cause, to which it has now been relegated, will be gravely and severely denied to it. In the domain of neurology the theory of rheumatic causation was for a long time the waste paper basket into which every difficulty was unsparingly swept, but the advances in this department have recently been so marked that this once ubiquitous and all-embracing cause has been reduced to very ignoble dimensions. It would be possible to give numberless instances, but the most recent must serve. That terrible disease, terrible in its sudden onset, terrible in its life-long deforming and disabling effects, and most terrible perhaps in its selection of the physically most promising of children, known as anterior polymyelitis, or infantile paralysis, was until quite lately regarded as rheumatic in origin. Even Sir William Gowers says "that it is probably due to some chemical change in the blood analogous to that which seems to cause rheumatic fever," and before his time this view seems to have been generally accepted. It is now believed, on evidence which has been accumulated by Cordier, Leegard, Medin, Caverley, Pieraccini and others abroad, and systematised by

Risien Russell in this country, that the disease is really an acute specific, occurring frequently in epidemics, chiefly in the months of June, July, August and September, and that, whatever else may be its etiology, it has no more to do with rheumatism than it has with whooping-cough.

The process which has thus been going on of relieving rheumatism of its neurological burdens has resulted in the reduction of these burdens to two only. The one, Chorea, has a very definite, if dimly understood, relationship to the rheumatic family; the other, facial paralysis or Bell's palsy, is one of those which, having been swept by traditional nescience into the waste paper basket aforesaid, still lingers there for want of a rescuer. That such a one will before long appear it seems impossible to doubt. Nothing could be less satisfactory than the theory of indefinite chill and the label of "rheumatic" which are, all but universally, affixed to this disease. In its commonest form the facial paralysis which we are considering is a true neuritis. It is not, as was formerly supposed, due to pressure on the nerve elements by infiltration between them and the sheath, but is, as has been shown by Minkowski, Tichonow, and others, a destructive degeneration, in every way comparable to that which characterises a neuritis occurring elsewhere.

The symptoms of Bell's palsy are too well known to demand a detailed description here. The whole of one side of the face is paralysed, and the opposite side, owing to the action of the unopposed muscles, appears to be drawn. The results of the paralysis are apparent in the upper as well as the lower segment of the head; the eye cannot be properly closed, the brow cannot be raised or contracted, whistling is impossible, food collects about the sides of the teeth, and fluid is apt to run out of the mouth. The muscles on the affected side soon show altered reaction to electrical excitation. Increase to faradic stimulation at the end of about a week is looked upon as a sign of early recovery. Decrease of faradic irritability indicates that the probable duration will be more than a month, and if at this time this irritability is absent, and remains so for four weeks or more, then it is

unwise to be too confident that complete recovery will take place at all.

Bell's palsy is not easily confused with other forms of paralysis of the facial nerve. In paralysis of central origin, whether a monoplegia or a part of a hemiplegia, there are certain features which render a mistake unlikely. In the first place there is, in the central form, a remarkable difference in the degree of implication between the upper and lower segments of the face. The brow can be moved and the eye closed on the paralysed side, whereas the teeth cannot be "skinned" nor the lips pursed up. This escape of the upper facial muscles is believed to be due to the fact that their movements are represented on both sides of the brain. There is also, in the central form, the rather inexplicable difference on the affected side between movements due to volition and those due to emotion, the former being absent, whereas the latter are present. Thus the paralysed muscles will remain immobile to an order to show the teeth while responding briskly to an invitation to smile. Finally, there is the electrical reaction, which, altered in Bell's palsy, remains unaffected in a paralysis of central origin. In a hemiplegia, moreover, the observer is not likely to fail to note the concomitant implication of the arm and leg on the same side, and the deviation of the protruded tongue to the affected side. In a crossed hemiplegia, where the face is affected on one side and the limbs on the opposite side, the above-mentioned characteristics of a facial palsy of central origin will not be present, for the reason that the implication of the facial nerve has taken place at or below the nucleus, so that that portion of the paralysis is peripheral and not central. In such a case the facial symptoms would be those of a Bell's palsy with superadded paralysis of the limbs of the opposite side, and probably conjugate deviation of the eyes to the side of the paralysed limbs. A difficulty could therefore scarcely arise.

From the point of view of prognosis and treatment it is important to be able to decide upon the seat of the lesion which is giving rise to a facial paralysis of the type which we are considering. When there are no symptoms other than

those of paralysis of the facial muscles, then the lesion is outside the stylo-mastoid foramen, and the palsy is unquestionably one of so-called rheumatic origin. If, in addition to the affection of the muscles of the face, there is loss of taste on the anterior two-thirds of the tongue on the same side, then the lesion is situated, in part at any rate, inside the stylo-mastoid foramen. The affection of taste means that the chorda tympani is implicated, and this shows the lesion to be situated at, or internal to, the point where the facial gives off the chorda. In such a case the palsy may still be of "rheumatic" origin, but it would be more severe and of longer duration than it would be in the absence of any implication of taste. If hearing is affected the case may at once assume a grave aspect, because this addition to the symptoms indicates one of two things, both of which may be serious. In the one case there is either middle-ear disease, which, so far as the paralysis is concerned, has a very unfavourable influence upon prognosis, or it may indicate caries of bone, which will probably give rise to troubles far worse than the mere crippling of muscles. In the other case the lesion is situated at the base of the brain, and is probably a gumma or a tumour of some sort. If there is hyper-sensitiveness to sounds, especially to musical sounds of a low pitch, then the disease involves the nerve in the auditory canal and the symptoms are due to paralysis of the stapedius. A careful examination of the ear would be necessary before arriving at a conclusion as to whether the affection of hearing was due to otitis media on the one hand or to caries on the other. Where the deafness was due to pressure exercised on the seventh and eighth nerves as they lie together at the base of the brain, other symptoms, such as optic neuritis, would probably be present. Facial paralysis associated with deafness may also be due to a cerebellar lesion, in which case there would be other symptoms, such as the gait, suggestive of such a site.

When the disease giving rise to the paralysis of the facial muscles is situated so as to involve the nucleus of the facial nerve in the pons varolii it is almost certain, from the close aggregation of the nuclei in this situation, that others of the

cranial nerves will suffer at the same time. The one most likely to be affected under such circumstances is the sixth, giving rise to paralysis of the external rectus on the same side and consequently internal squint. From involvement of the same nucleus there will probably be conjugate deviation of both eyes towards the opposite side of the body. Finally, it should not be forgotten that a one-sided facial paralysis is sometimes hysterical. Such cases often present great difficulties in diagnosis at first, but a little patient observation will usually make the matter clear. It is sometimes stated in textbooks that lesions of the trunk of the facial give rise to paralysis of the soft palate. This is an error which, curiously enough, emanated from Bell, who first described the disease. If in such a case the soft palate should be paralysed, it is a complication due to some implication of the vagus or glossopharyngeal nerves, from which the levator palati derives its supply. In connection with the innervation of the facial muscles, it has often been observed that their otherwise complete paralysis in Bell's palsy is occasionally modified by a relative escape of the orbicularis palpebrarum and the orbicularis oris. This is explained by assuming that the former is supplied partly by the third nerve and the latter partly by the hypoglossal, an assumption which is supported by several facts, notably by a case reported by Sir William Gowers, in which the orbicularis oris was spared, although degeneration of the facial nucleus was shown to exist.

Facial paralysis, especially when it has been severe and of long duration, is liable to be followed by secondary contracture of the affected muscles. The contracture comes on after the palsy has passed off and, inasmuch as it causes that side of the face which was previously paralysed to be drawn from the middle line, its occurrence sometimes gives rise to a doubt as to which has really been the affected side. If the possibility of contracture were remembered the doubt could never arise, because, although there is over-action of the previously palsied muscles, those on the sound side retain their proper contractility. In addition to contracture and over-action there is frequently noticed a measure of spasmodic

twitching, which seems to affect the zygomatics by preference. Secondary contracture is a very unsightly and very annoying consequence of facial paralysis, and the possibility of its occurrence should not be lost sight of when giving a prognosis. When it occurs and remains for a week or more in a stationary condition, no improvement can be expected.

The treatment of a case of so-called "rheumatic" facial paralysis resolves itself into the application of such measures as will preserve the tone of the muscles during the period of their enforced inaction. For this purpose electricity naturally suggests itself, and it is a commonplace of the text-books to recommend it in that form to which the muscles will respond most readily. Faradism is, however, a very dangerous weapon, especially in the hands of the zealous. Its too frequent or too prolonged use undoubtedly increases the tendency to contracture. Galvanism is less open to this objection, but it is, on the whole, better to attain the end in view by means other than electricity. If this agent is employed at all in these cases, perhaps the best use to which it can be put is presented by a case which recently came to my knowledge, in which the practitioner, as soon as he had diagnosed the condition, hurried home and shortly returned with an antiquated galvanic battery, in which the electricity was generated by turning a handle. After initiating a member of the family into the mysteries of the machine, he directed that the poles should be applied to the drawn side of the face whenever it felt tense! The patient made a good recovery, and there has been no secondary contracture. The truth is, more harm is likely to ensue from injudicious treatment than, in slight cases, from the disease itself. Another terrible weapon in the hands of the heroic is counter-irritation. A small mustard-leaf behind the ear, if it does no good, is certainly innocent of any harm, but the excursions into preparations of cantharides and croton oil which are sometimes indulged in, are altogether indefensible. They give rise to unnecessary pain, and have been known to cause cellulitis. A better way than either electricity or counter-irritation is to maintain the irritability of the muscles by such means as warm douching, massage, gymnastics, and that

minute attention to the general health to which patients, even the most refractory, submit so readily at a spa. There are probably no cases which improve more rapidly or more decidedly under spa treatment than those of peripheral neuritis, of which, it is to be remembered, Bell's palsy is one. There is no reason why these measures should not be general as well as local; but, be the necessity for general douching and the general massage never so urgent, and their application never so vigorous, let them, when applied to the affected side of the face in Bell's palsy, be, above all things, moderate in amount and, in degree, gentle.

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## THE DEGENERATIVE RESULTS OF DEFICIENT VENTILATION.

BY CHAS. DENISON, M.D.

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THE idea that a known (?) disease like tuberculosis springs from the evolution or rather dissolution of the forces which have to do with our being, that it is an evidence of the *variation* of the law of *harmony to environment*, a retrograde movement towards dissolution and death; this idea, I say, of a basic law of degeneracy, which finds its chief expression in this wasting disease, is too profound to be easily grasped, too adverse to our set habits of thought to be easily accepted. Therefore, if I fail to convince the hearer in a necessarily curtailed presentation of proof, let me suggest that he simply suspend judgment till the opportunity happily occurs for him to study John Fiske's "Outlines of Cosmic Philosophy," especially the interesting chapters on "Matter, Motion, and Force," "Rhythm," "Evolution and Dissolution," and the "Sources of Terrestrial Energy." Then I think he will come to the same conclusion here reached and have a clearer understanding of this matter.

There is a deeper and more fundamental source of knowledge than that which the microscope, with its wonderful delineation and detail, can supply; and the liability of being side-tracked by that instrument's findings should be recognised, that we may not fail to grasp the true origin of our degenerative diseases and their evolution.

An important fact in evolution is that, all the way up to man, the beings evolved have had no voice, save instinct, in deciding their destiny. With the advent of man, however, there was something added to the law of the survival of the fittest, that is, a deciding brain. This higher order of life—the soul of man with its Godlike attributes—involves not only equivalent responsibility, but the possibility to mistakes, because of that responsibility. I am not a preacher to

expound and lament man's moral errors, but of all his physical ills the profoundest and most far-reaching mistake which we now have to analyse is known through its results in the disease tuberculosis, the lately termed "white scourge" of the race. Let us try to free our minds from preconceived beliefs and, rising above the details of bacillary evidence, try to determine how far man himself is to blame for his miseries; then try to learn how the punishment of this scourge is as it should be in the divine order of our creation and our evolution. Thus we may come to realise that tuberculosis springs from the mistaken adaptation of man to his environment, *i.e.*, is chiefly due to the faulty civilisation of the present time.

The instinct of the Rocky Mountain beaver teaches him to build his winter hut in conformity to his environment, and wonderfully so with regard to the severity or mildness of the approaching season. A shrewd weather prophet interprets these findings and prognosticates the future for his fellow men. Who will prognosticate the probabilities of life and death from the character of our own habitations? Are they a healthy outgrowth of man's conformity to his environment? No, it is here, as I hope to show, that the greatest nonconformity lies. The question of the suitability of man's abode and life to his highest development may, I think, be studied better through the subject of *ventilation* than in any other way.

There was a man in our town who was much annoyed by the constant dinging of a piano in an adjoining apartment of his lodging house, so he rigged up a gong run by electricity and his improvised music was made to loudly accompany the piano till the latter stopped. If there could be an automatically acting ventilator invented, built into a window pane or into the outside walls of a room, which would sound a gong whenever ventilation was imperfect—by reason of any excess of carbonic acid or any organic impurity above an established healthy standard—and such device were used in all living rooms, there would be so much noise in every town that nothing else could be heard. The racket would probably bring relief in perfect ventilation and the readjustment of the hearing organs to suit this noisy

environment would be accompanied, or rather ante-dated, by a great decrease in the degeneration which induces tuberculosis. The reward for the successful inventor of such an automatic ventilator should be great, for the good results would be almost inestimable. Of course a visual index of atmospheric purity and impurity might be substituted for a sounding alarm or gong which, when the desired limitations were reached, could be made to show them.

This would not be a more wonderful discovery than many that have been made of late—as, for instance, the thermostat, or heat regulator, which automatically controls the heat of a building within one degree of a desired point—but what a salutary correction it would be of the defects of our living rooms.

Let us take an average living room, say 14 feet square and 10 feet high. Not wishing to be illiberal I have assumed this as the average size, approximately, of living rooms where one person sleeps at night or lives by day. There is, we will say, one door and two windows to each such room. Of course we can instance such a room wherein half-a-dozen sleep, and again we may know of a home where one person occupies a room of three or four times that space. It is a fair average we are after. We will say this 2,000 cubic feet space represents about the average of the hundred thousand living rooms there are in a city of that many inhabitants. It should be noted that the total window space is one half covered with curtain, and as the sun can be shining into only one side of a house at a time, and as half the time he is usually shut out by clouds, how little of the direct sun's rays can get into this average room.

We will further describe this room as having no fireplace in it (the great majority have not), and as having the door shut nine-tenths of the time, and a window not open one-tenth of its area for one-tenth of the time.

This room has been evolved in the progress and is one of the results of our civilisation. We may admit its necessity because it is here to stay; but the evolution of its ventilation is as yet an unsolved problem to over 90 per cent. of humanity.

What, then, should be sufficient ventilation that health may not suffer for the want of it? It is not merely that the carbonic acid which is thrown off from the lungs shall be replaced by its equivalent of oxygen from the outer air. So perfect are the joints the builders make, in this day of advanced art in architecture, that a guest-room, though aired and then unused for weeks, may need ventilating again before a new occupant enters; why? because it has lost the natural qualities of the out-door air.

A man exhales 400 volumes of carbonic acid to every two to four volumes he inhales; he must then have 4,000 cubic feet of air per hour, as Parkes says, and 1,800 as Briggs determined, lest the carbonic acid in a room exceed 6 in 10,000 and 8 in 10,000 parts respectively, which they separately considered to be the limits beyond which impurity should not be allowed to go. It is estimated that two candles give off as much carbonic acid as a man, a lamp as much as two men, and an ordinary gas burner nearly as much as do six men; so, in addition, these sources of impurity must be considered. Ventilation necessitates the recognition of the fact also, based upon the consumption of a pound of coal per hour, that for heating a room 2,072 feet of air will be required for fourteen hours in the day. A thorough knowledge of ventilation necessitates, likewise, an appreciation of the various activities of persons contained in a room; also of the extra equivalent space in a room needed to off-set the rarefaction of the air at great altitudes; also the estimating of various diseased states—as when, during fever, additional poisons are thrown off into the air—and also the determining of the chemical and organic changes taking place in laboratories and workshops.

Though all these are important, there is still something more needed to secure perfect ventilation. That the air-change in this size of room is inadequate it is not only my purpose to show, but that there are other faults about this room, even were it twice as large, which seem not to have been generally, if at all, recognised. This, I think, I can make you appreciate in asking you to consider with me *the life*

of the air. We will come to see that there is a vitalising principle whose force is annulled by the imprisonment of the air through defective ventilation.

How shall we express our conception of this vitalising principle so that we may recognise its dissolution under absence of ventilation? If we only had some simpler way of giving to the sun his due credit as the source of all the heat, light and motion of life manifested on the earth than has Fiske, who says, "The difference between the tropical heat of India and the cold of the Arctic regions is simply the measure of untold millions of tiny differences in the rates of oscillation of countless atoms of atmospheric gases, determined in turn by innumerable oscillatory movements propagated from the sun to the earth."<sup>1</sup>

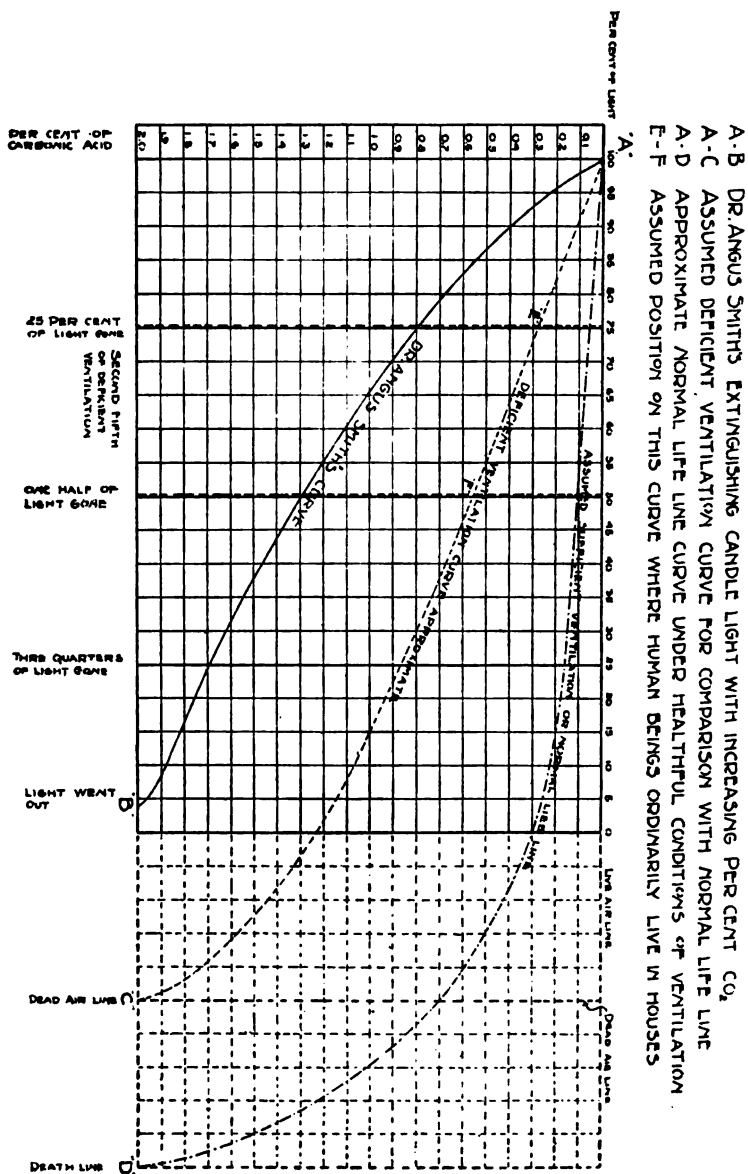
It is a simple statement, the truth of which I think all will accept, that *the life of the air exists chiefly in its motion*, which, with its light, heat and electrical or magnetic power, comes from the sun. If the absence of this life—here denominated as *dead air*—is represented as a perpendicular line, and *live air* is represented as another straight line at right angles thereto, as is the plane of a ceiling to the sides of a room, then the gradations from live air to dead air, under the subtle influences in which we human beings live and die, can be truthfully represented as a curved line which gradually leaves the horizontal line and comes down to the perpendicular. This deficient ventilation curve is not the same, but much like Angus Smith's curved line (see illustration), indicating at stated times the measure of the light of a candle when gradually extinguished by being confined in a closed space.<sup>2</sup>

You can fan this receding flame into life, as you can revive

<sup>1</sup> "Outlines of Cosmic Philosophy."

<sup>2</sup> The Table explaining this Angus Smith curve gave regular periods of time till the light went out, and the extinguishment was divided into gradations from  $\frac{1}{16}$  of 1 per cent. carbonic acid, up to 2 per cent when the light went out. It took  $\frac{1}{16}$  per cent. carbonic acid for the first quarter of extinguishment,  $\frac{1}{16}$  per cent. for the second,  $\frac{1}{16}$  for the third and  $\frac{1}{16}$  per cent. additional carbonic acid for the last quarter and total extinguishment.

— DIAGRAM ILLUSTRATING VENTILATION —



a gradually extinguishing human life by opening a window, but let the previous stillness supervene and the perpendicular line of extinguishment is surely reached. It is this important fact of *the proportionate and gradual loss of light* I wish to call attention to, and by it to illustrate the proportionate loss of *vitality* in a degenerative disease. Both these losses are so gradual in the beginning they are unrecognisable. A similar curve is the line of life of the human being who is dying or to die of tuberculosis. So gradual and imperceptible to his comprehension are its graduations, he does not know where he is on the bend of the curve ; but he knows quite as much about it as he does about the deficient ventilation curve, represented by the graded line from live air to dead air. We none of us appreciate our own individual positions upon this ventilation curve, as to the respective confinements of our bodies in closed spaces, and the resultant imprisonment and dwarfing of our respiratory and circulatory systems ; and it becomes a pertinent question to each one of us : Shall we be exterminated by these conditions, or will the final extinguishing act be transferred to our children, handicapped as they will be by our present ignorance ?

Where, on our imaginary deficient ventilation curve, is the sample room we have herein described ? Do I controvert your judgments, you physicians, who have so often felt like smashing the scanty windows of the sick or sleeping chamber in order to let in some pure air, by saying that its imperfect ventilation places it in the second fifth division, that is, it is 20 to 40 per cent. along on the downward extension of the curve. Admitting this you see the whole force of my argument. It is by contrast we must judge and our sensations are only partial guides. The purest air, and therefore the liveliest air I know of is found when you stand on some eminence in the rays of the rising sun, with the air coming to you from off the hills or mountains beyond, sifted through pines and firs, and with your feet upon the dry but negatively electrified ground, while your head, or perhaps your whole body, is in the strongly and positively electrified atmosphere. You breathe into your uttermost air-cells this ozonised air, and your cast-off

carbonic acid goes from you the instant it is exhaled. Every nerve in your body is stimulated to normal life, and your very soul is lifted up in thankfulness to God for His provision of this feast.

Turn now to a counterpart picture. The deadest air I think I ever breathed was in the mammoth cave of Kentucky. I found there little 12 by 6 by 8 ft. rooms, constructed of stone with one door in each, and a 16-inch square window. These had been built for the supposed good climatic effect of the *equable* temperature, always 58° F. I was told that they took sixteen consumptives down there for one month. Four died down there, one a week after coming out, and none were benefited. In comparison with the positive effects of live air cited above, such negative conditions, such deadness of atmosphere and ignorance of the requirements of human beings, gives the mind an ineffaceable shock and impels it to dwell upon the machinations of the devil, whose abode, except as to its traditional temperature, this cave typifies! Should a further illustration of *dead air* be needed, call to your imagination the lead chamber which Angus Smith constructed for his experiment,<sup>1</sup> and in which no possible interchange of air with that outside could occur. Imagine Dr. Angus Smith remaining therein, rebreathing its atmosphere as he did till candles went out, and you will have a good idea of what I mean by absolutely dead air, upon the effects of which, as described by this faithful investigator, I have not time here to dwell.<sup>2</sup>

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<sup>1</sup> "Air and Rain."

<sup>2</sup> Dr. Angus Smith (in his "Air and Rain"), in describing his sensations when confined in his experimental "lead chamber," containing 170 cubic feet, says of the chemical actions going on in the body: "They may take ten years to gather impetus to make their movements strong enough to produce sensations, and disease may be generated unknown to the individual, although it may kill him in the eleventh year, but if the chemical action began at first so violently as to produce decided sensations, he might be able to avoid it at once before it produced any abiding impression." After remaining in his chamber 100 minutes he found a reduction of oxygen to 20 per cent., and "the air had an unpleasant flavour or smell," and on entering it again after a minute he found "it extremely bad." He says, "it took about four hours for the lungs to recover their tone."

Previous to this experiment, Dr. Angus Smith had thought the real evil was from organic substances in the air, but afterward he concluded that carbonic acid, even in small amounts, had an injurious influence. In this connection it is interesting to note that Lavoisier and Saguin found that the human limit of the possible rebreathing of air was when the carbonic acid had reached 10 per cent., and that "was bearable only for a short time," while Angus Smith says, "it seems to be impossible to endure 4 per cent. for any length of time."

The life of the air consists, to a greater extent than has been heretofore recognised, in the molecular motions of its atoms caused by the sun's influence. The diffusibility of the air, the easy motions due to changes of temperature in different strata, and the fact that light as well as sound depend upon the wave motions of ether, are all forms of molecular activity which probably impart the life-giving principle to our atmosphere. This motion is always present till meddlesome man interferes. For instance, if a narrow beam of light is thrown into a closed dark room in which the air is apparently still, every particle of dust is seen to be in constant motion. From the fact that there are varying states and amounts of electricity in the different strata of the atmosphere, a conclusion is justified that finer forces govern the life of the atmosphere than merely its composition of oxygen, nitrogen, moisture and carbonic acid. Besides, let us not forget the contribution of vitality vegetation brings through its constant interchange of oxygen for carbonic acid. This, with the qualities of atmospheric electricity and molecular motion, are all *in restraint* if not wholly annihilated in our supposed poorly-ventilated room.

This restraint of molecular motion and, therefore, limitation of vitality, are in direct proportion to the deficiency of ventilation. Herein, I conceive, lies the great mistake of our civilisation in relation to healthful human life. Here is to be seen the need of education that this cause of disease may be understood.

Let us try to elicit analogous evidence of vitality in the growing media of other products of nature than that of the

dwellers above the surface of the earth. The ground in our latitude becomes regularly *dead earth* to vegetable growth as the cold of the fall and winter gradually annuls its vitality, but the warm penetrating rays of the sun in spring and summer as regularly again transform it into *live earth* for the wonderful fructification of plant and animal growth. Plants, too, have their life-curve, which depends upon the vivifying and transmitted influence of the sun's rays. Shut out that influence and that life-curve becomes immediately abbreviated.

Again, let us consider the fish class, a medium creation depending upon air and water for its atmosphere and food. They constitute its life-giving agency and cannot be greatly changed without its extinction. How wonderful is the effect of the fish's environment upon its life-curve and upon its distinguishing characteristics, as shown by the eyeless inhabitants of dark caves, and the big-eyed sun fish of the open pond, the sluggish succor of the mud creek, and the lively grayling of the rapids.

The liveliest water I have ever seen was when, within view of a snowbank in the Rocky Mountains, a cold, dashing, mountain stream lashed itself, by its perpetual motion over the rocks and stones, into a fit abode for that king of fishes, the mountain trout, that creature full of ozone and vim, which life elements he transmits even to the fisherman who joyously captures him.

Note the difference in the life quality of that trout and of another one of the same species pulled sluggishly up from 100 feet below the surface of a still lake. The higher the order of evolution, *i.e.*, the more delicate and special the development of the nervous structure, the more susceptible to, and influenced by, the changes in environment are all created beings.

Applying this principle to the human family, we see that a limit of civilisation can be reached where delicate or small changes of environment may dissolute as well as evolute; where *extinction*, even from *lack* of conformity, may take the place of *evolution*, because of conformity to our environment.

There are two sides to every question ! We may argue against the cramped chest and round shoulders of the bicycle rider ; but the bicycle is doing a world of good in getting people out of doors, in addition to the improved aeration of the blood which results from its use.

We admit the "visiting the iniquities of the fathers upon the children unto the third and fourth generation," meaning in these days syphilis and like hereditary evils ; but this law of transmission likewise works itself out to the extinction of the users of defective and deficient ventilation.

We discuss the inhalation of irritant powders and poisonous gases occurring in certain hazardous occupations, but defective ventilation, considered in conjunction *with* such causes of disease, increases their injurious effects many fold.

We may reason, as with few exceptions everybody does, that the bacillus of tubercle being the constant accompaniment of the decaying process in tuberculosis, is consequently the *cause* and source of all this evil ; but the very lateness of its appearance shows it to be rather a *result* than the cause. Its absence in so many forms of scrofula, adenoid growths, wastings and catarrhs, surely eventuating in mature tuberculosis, show that the pre-tubercular and perhaps the first stage of tuberculosis is already established, presumably in advance of the germ. These conditions are proved by the tuberculin test to be a part of the real disease before the microscope or any other ocular demonstration of the bacillus is possible. The Widal test for typhoid fever now joins the tuberculin test in showing a dyscrasia to exist which we know is the presence of latent tuberculosis. This occurs before any ocular evidence is possible of the mature germ.

The destructive influence of sunlight upon the bacillus of tubercle is now generally admitted.<sup>1</sup> If, in addition, the contention of Fränkel<sup>2</sup> that it is a *facultative anærobic* germ

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<sup>1</sup> Koch : "International Medical Congress," Berlin, 1890.

<sup>2</sup> Sternberg's "Manual of Bacteriology."

is sustained, then the claim of a predisposing cause in defective ventilation is strengthened by the favourable conditions furnished for such *germination* in the unventilated lung.

We thus go back of the tubercle bacillus germ to conditions which are bound under favouring circumstances to eventuate in it; and the following important statement is warranted, which controverts the trend of scientific thought of this decade as to the prevention of tuberculosis, namely, if all of Koch's bacilli of tubercle on this earth were instantly destroyed, in due time, *the same conditions remaining*, our world would again have an ample supply. It is not for me to pretend to know the exact time which would elapse, under such a supposed temporary dispensation of Providence, until the terrible intensity of the "white plague" would be again as great as at the present time. The *old times* would come back soon enough. Undoubtedly we would some of us, even those who are now incubating the germs, live longer and be much wiser for such an experience. We would, however, surely see the wave of bacillary domination sweep back over the human race, bringing the equivalent of the present time when, as Osler says, 2 per cent. of the people living have the disease, and when, as seems to me, ten times as many are getting ready for it.

Let us not mistake the providence of God. Tuberculosis has come here to stay until we, the thinking masters of creation, acquire the education to understand and abolish it. It will not "down" in response to any edict against street expectoration, the disinfection of rooms occupied by dying consumptives, or even the slaughtering of tuberculous cows, however important these measures of prevention most assuredly are.

Now the drift of this reasoning is to this conclusion: That tuberculosis springs from, or is the outgrowth of, some unified cause, which will account for its existence in cattle, horses and birds, as well as in man.

I wish to refer to the excellent paper<sup>1</sup> presented by Dr.

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<sup>1</sup> The Elimination of Tuberculosis Out in the Open," by the Author, *Journal A.M.A.*, February 3, 1900.

Chas. Cresswell to the National Live Stock Association, at their late meeting in Fort Worth, Texas. From his considerable experience as a veterinarian in Colorado, he shows that it is entirely unnecessary to use the tuberculin test with the "plains" cattle in the Rocky Mountain Region, because even those previously infected, and transferred to the plains, *there* outlive their tuberculosis, and it does not appear in the next generation. In proof he instances the surviving members and the progeny of a very badly-infected herd of over-bred Shorthorns, inbred and closely housed, of which I myself was cognisant. If also you bear in mind the great mortality from phthisis in the French and English cavalry horses under close stabling, which was quickly prevented by open-air stabling;<sup>1</sup> if also you are acquainted with the corroborative evidence of the close domiciling of cows, the confined caging of birds, monkeys, guinea pigs and other animals, the crowding<sup>2</sup> of human beings in ship-holds, prisons,<sup>3</sup> alms-houses,<sup>4</sup> and places

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<sup>1</sup> Parkes ("Practical Hygiene") refers to the experience with horses in the French cavalry service, and says that in ten years a loss of 180 in the 1,000 per year was reduced to 68 by giving them more room in their stables, while in English cavalry service the change for the better by similar treatment was even more striking, till the annual mortality was reduced to 20 per 1,000.

<sup>2</sup> Parkes ("Practical Hygiene"), in noting the relation of increased mortality to density of population, adds that "its main concomitant condition is impurity of air from overcrowding, . . . especially among children, whose delicate frames always give us the best test of the effect both of food and air."

<sup>3</sup> Dr. de Chaumont's analysis (Parkes' "Practical Hygiene") of the air in eleven barracks and hospitals showed an average excess of over 6 volumes carbonic acid per 10,000 and nearly twice that in the cells of four different prisons. Other and extreme analyses of air in rooms (in orphanage dormitories and detention places), with space per head all the way from 51 to 150 cubic feet, gave from 31 to even 73 volumes of carbonic acid to 10,000. The ratios were constantly greater the more confined were persons or animals.

<sup>4</sup> Carmichael found in the Dublin House of Industry (crowded with children) that "the only cause for the excessive amount of phthisis was the foul air and want of exercise."

Parkes says "the only circumstance which is common to the two classes (speaking of seamen and civilians working in confined close rooms and thus causing phthisis and lung disease) is the impure atmosphere."

Is not the subtle effect of the occurrence of hospital gangrene in closed

of public detention, or the civilising and housing of savages, as of the American Indian, you then have to come to the conclusion : that either tuberculosis results from (1) a species of auto-infection from rebreathing the body's own exhalations ; or (2) from the fact that the air of these confined spaces becomes a source of infection from the loss or annulment of its life-giving principle.

Thus we are brought back to our sample room, the abode of a human being, the meagre size of which, and its deficient sunlight and air circulation, afford a sufficiently marked degree of deficient ventilation to constitute it a glaring fault of our civilisation. This now seems to be the initial cause or starting point of tuberculosis, which probably kills more people than does war, together with any other one form of disease known.

The study of the remarkable diffusibility and penetrability of gases, even through glass windows and brick walls, not to mention wooden doors with the many cracks around them, gives us some hope through what is called "insensible ventilation."<sup>1</sup>

But the fear is that even this much of protection will be annihilated through the *perfection* (?) of carpentry. The education which the people need, even the common people and we doctors too, *must* be obtained, and the architects and builders are not exempt from this necessity.<sup>2</sup>

wards, and its infrequency in tents, an indication that the closeness is to blame ?

<sup>1</sup> In illustration, take notice of the dark lines on the plastered ceiling of a much-used room. They are the interspaces between the laths where the dirty air has been sifted through.

<sup>2</sup> That the education needed must be mainly directed to the ventilation of closed habitations is beyond any doubt ; for Angus Smith's calculations ("Air and Rain"), made in the cities of London, Manchester and Glasgow, showed so small a difference in the per cent. of oxygen, as well as of carbonic acid, *in the open places*, that we can conclude that it is not so much the size of the city or the number of rooms in it, as it is the character of the rooms themselves. Parkes says, "the colliers of Durham and Northumberland, where the mines are well ventilated, do not appear to suffer from an excess of lung disease, or do so in a slight degree." While as to "metal miners" he says, "among them there comes to be, in advanced life, for the males of ages from 45 to 75, five times as many deaths from pulmonary disease 'as for males, exclusive of miners, in Yorkshire.'" This

A more thorough study of this intricate question would lead the architect, whose usefulness is too much limited by the demands of an ignorant public, to be an upbuilder of people's health as well as of their houses. It is to be hoped he will thus arrive at a more encouraging conclusion than did James A. Greenlief, C.E., in his "How Much Ventilation?" when he said: "for the ordinary private house a systematic air allowance per individual is almost an absurdity, for many of them a thorough systematic plan of ventilation is unnecessary, even were it not debarred by reason of the expense inseparable from it."

Whether ventilation, suited to the size and purpose of a building, the climate and the exposure, shall be by *natural* or *artificial* means, whether by *propulsion* or *extraction*, and how modified by the great variety of artificial aids of heat, steam power and electricity, we have not here time to consider in detail. My object now is to emphasise the *need* of ventilation of our living and working rooms. The lack of it leads to the pale face, sallow skin, weak pulse, with cold hands and feet, and with sluggish bowels; the feeble powers of digestion, assimilation and nerve energy; all proofs of a flagging vitality. This lethargy is due to the enfeebled and poisoned-blood corpuscles, and a probable auto-infection, but worse than all to the deprivation of food for the blood, *i.e.*, oxygen from the air. In addition the dead air, which marked deficiency of ventilation implies, compels in the lungs that inactivity and

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latter evidence bears upon the quality of the dust in crowded places and rooms. It is organic to no small degree. Tichborne (Parkes' "Practical Hygiene"), in a Dublin street, found it from 30 to 45 per cent. organic and Chalvet, in a hospital ward in Paris, found the dust to be 36 to 46 per cent. organic matter. The sickening headache which some sensitive persons experience in, or after attending a crowded theatre, is probably not wholly due to the rebreathing of excessive carbonic acid. This "crowd poison," as this air of crowded halls is sometimes called, undoubtedly contains much organic matter thrown off in the exhalations of the people there assembled. Even the moisture of these exhalations is no inconsiderable matter. Parkes averages an estimate of 211 cubic feet of air needed to maintain, in a state of vapour, the 25 to 48 ounces of water which a human being gives off in twenty-four hours' time, and he adds that when carbonic acid in the air has reached 7 in 10,000, the smell of organic matter is generally perceptible, and it is "very strong" when 10 in 10,000 is reached.

limited use which in turn means the gradual clogging of out-of-the-way air-cells with the products of combustion. There and thus in the lungs carbonic acid poisoning and the specie of auto-infection heretofore described, are most naturally located and more or less permanently established.

I will not pretend to say what the detail of a law of ventilation will be, but there should be such a law, and that, too, enforced by proper legislation. That detail will be an out-growth of the education which is essential to right legislation. In general, however, it should limit the minimum ventilation allowable in every assembling place or habitation for human beings, and for dairy cows, horses, &c. That limitation should be adjusted to the various lives and their activities with which the law has to do. If law can protect life as it aims to do, by fire escapes, the necessity of stand-pipes, the abatement of the smoke nuisance, the ventilation of sewers, and the non-pollution of drinking water : why should not this subtler and ever present cause of degeneration and death, *defective ventilation*, even in its slighter degrees, come under its fostering care ? Certainly it should. I suggest that the effort should be made to establish and maintain the equivalent of the following : To wit, for a living apartment a minimum space of 1,500 cubic feet per individual, and a minimum ventilation, or change of air, of 2,000 feet per hour per person. If this much is not otherwise afforded in all new houses, then transoms over outside doors and windows, preferably opening inward at their tops, should be required.<sup>1</sup>

A course for the study of ventilation should be made a prominent feature in all advanced schools and colleges, and the Government should carry out the many investigations which will help to determine both the best means and the

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<sup>1</sup> The variation of a proper law may be needed to suit the assembling of large bodies of people in halls, churches, &c., where occupancy is limited to a short time and a less space *per capita* seems to be allowable, or again where additional air is required, as in hospitals and certain workrooms. But the building inspector, properly working with or under the Board of Health, should not only be possessed of a spirit of the law's righteousness but he should be a man of high intelligence and force.

proper and necessary limits of ventilation. This is one of the ways in which a *National Bureau or Board of Health*, properly established and supported by our general Government, could prove itself one of the most useful and worthy of all the different departments which are represented by secretaries in President's Cabinet. Until such a national Board is established the Government ought to found and liberally maintain a Commission on ventilation of houses, public halls, schools, factories and mines. Properly conducted, such a Commission could do a world of good.

# STAMINA : WITH SPECIAL REFERENCE TO THE CONSUMPTION OF FAT FOOD FOR ITS MAIN- TENANCE AND AS A PREVENTIVE OF TUBER- CULOSIS.

BY A. N. BELL, A.M., M.D.

WHILE every observer recognises the progress that has been made during recent years in the prevention of, and the reduction of mortality from, tuberculosis, by dealing with unsanitary surroundings, the establishment of sanatoria, changes of climate, &c., it seems to me that no one who even approximately comprehends the universality of microbic life—and of none more than tubercle bacilli—can fail to perceive that, however much we may be able to modify the external relations bearing upon liability to tuberculosis, nevertheless every individual, no matter where his dwelling place, is more or less subject to tubercle bacilli ; for, besides the utmost restriction of their prevalence by human effort, unless the individual is possessed of an organism sufficiently fortified to resist and overcome conflict with them—for the conflict is certain everywhere—he is liable to contract tuberculosis. Indeed, every predisposing cause of disease is a challenge to one's power of resistance. Every intelligent person knows that the power of resisting the ordinary exciting causes of illness, such as sudden changes of temperature, exposure to damp soil, room or sheets, or night air with the windows closed, depends upon one's state of health. The power of resisting microbes as an exciting cause of disease is no exception.

Health fortified by such conditions as the organism depends upon for its fabrication and maintenance opposes itself to all exciting causes of disease by the relative integrity, strength and vigour of all the organs and functions of the body. A person thus equipped, if beset by tubercle bacilli or other microbes, effectually resists them, devours them by oxidation and casts them off.

Feebleness, on the contrary, though not always appreciated

and sometimes cultivated, indeed, by the practice of that altogether too popular fad, abstemiousness, is always and everywhere a prevailing "predisposition" to disease; and, associated as it commonly is with inadequate nourishment, it is the most frequent of all incitants to tuberculosis. Abstemiousness, however, is variable in its practice, and uncertain; one may over-eat and yet abstain from some essential food necessary for the maintenance of health. Adequate nourishment and stamina depend upon the supply of nutriment in the kinds and proportions required by our bodies.

By a somewhat extended observation and careful study of the relation of tuberculosis to food, I have come to the conclusion, which it is the purpose of this essay to vindicate, that, other conditions being equal, tubercular diseases are prevalent in the inverse ratio to the use of fat of some kind as an article of diet.

Antecedently, in persons on the verge of pulmonary consumption, inability to digest fat food is one of the most prominent symptoms. They are afflicted with dyspepsia, of the kind in which an acid stomach is predominant—that kind of dyspepsia which is the common effect of the excessive and too exclusive use of farinaceous food, insomuch as, in some cases, to have created a loathing of fat food in every form. Nevertheless, in medical practice generally, this condition is an indication for the use of fat food. Cod-liver oil, emulsified or otherwise, is almost universally the first remedy resorted to and the most persistently urged. Butter or bacon, the most digestible of all fat foods, I have often found to be more acceptable. Fat is the needful thing to energise both digestion and nutrition. And that form of it which is the most acceptable is the best.

In this relation I am reminded of a conversation on the subject with an old naval colleague, the late Dr. Richard McSherry, of Baltimore, some thirty odd years ago. He related a case then but recently under his care, in substance as follows:—

A much emaciated German shoemaker, with pronounced phthisis and a particularly rebellious stomach, had been an

office patient for several months. He had tried various ways to render cod-liver oil acceptable, but with discouraging results. The patient was evidently losing ground and the intervals between his calls increased until they had ceased altogether; his condition was such, at his last call, as to leave but one inference. About two years had elapsed, when, on responding to an early morning call and going to his office, he faced a full-bearded and healthy-looking man, who accosted him familiarly, and then, checking himself, said, "Doctor, you seem to forget me. Don't you remember the old half-dead patient that you tried to feed wid cod-liver oil two years ago?" He did remember, and he said to me that he was never more astonished in his life—he could hardly believe his senses. And before hearing the purpose of his old patient's call he pressed him to tell where he had been and what he had done—what treatment he had been under—to account for the wonderful change in his condition. He replied briefly, because he was in a hurry: "Vell, when I couldn't call on you no more a countryman of mine tole me that he was wunst jist as bad as I vas, and somebody tole him to take dog fat. So I kill my dog and fried out his fat and went taking it. I been taking dog fat mos ever sence—doctor, won't you please go see my wife; she's goin' to have a baby."

It was only the fat.

I would be second to none in my appreciation of the success that has attended the efforts of sanitarians and others, in England and elsewhere, for the prevention of tuberculosis, before as well as since Koch's immortal discovery of the tubercle bacillus; nor of my appreciation of the benefit of change of climate, or resort to an ocean atmosphere as means of lessening the susceptibility to and treatment of, and reducing the mortality from, tuberculosis. But for the prevention of the disease none of these means, nor all of them together, are, in my judgment, comparable with the benefit derivable from a generous supply of fat in the dietary.

As regards the general history and geographical distribution of tuberculosis, its prevalence, more or less, is contemporary

with mankind everywhere. The number of localities throughout the world alleged to be exempt from it is so small as to justify the conclusion that no place inhabitable by man is exempt, that tubercle bacilli are universally distributed. They are proportionately active with the prevalence of conditions favourable to their reception and tolerance, and the deficient power of man's resistance. The accessory conditions are, in general, density of population, foul soil, foul air, deficient sunlight and exclusion of fat food. Diminution of the prevalence of tuberculosis by the amelioration of these conditions, though very great—about 50 per cent. in England and Wales alone—during the last fifty years, is on a par with the reduction of the prevalence of other diseases.

Some writers are wont to refer to Iceland and some other arctic and sub-arctic regions, whose inhabitants rarely or never have consumption, though they commonly sleep in stifling huts, reeking with offensive emanations, that are but rarely or never cleaned. Furthermore, the denizens of such huts at night habitually expose themselves in the daytime to the worst possible conditions of weather. Their exemption from tuberculosis is commonly attributed to the extreme cold of such regions, and the erroneous inference drawn that outdoor exposure in frigid climates is commendable for consumption.

The food of these exempt communities is almost wholly of an animal character, the fattest portions, and "toodnoo," a kind of butter made of the separated fat of reindeer, of which they eat enormous amounts.

Moreover, besides their power of resistance to the tubercle bacillus, the Esquimaux and other inhabitants of the arctic regions who live on such food are possessed of gigantic muscular powers. They are able to lift and carry burdens twice as heavy as those which the seamen visiting them are able to carry.

In similar regions where the inhabitants or immigrants do not consume much fat food tuberculosis is no less, indeed, among some of them it is much more rife than it is among communities in temperate latitudes.

Fat, as an article of diet, furnishes the potential force necessary for the conversion of other food material into organic tissue and to maintain the bodily functions.

Professor W. O. Atwater, in one of his most recent contributions to the Department of Agriculture<sup>1</sup> on the nutritive value of foods, in comparing nutrients in respect to their fuel values, their capacities for yielding heat and mechanical power, states that "a pound of protein lean meat or albumen of egg is just about equivalent to a pound of sugar or starch, and a little over two pounds of either would be required to equal one pound of the fat of meat or butter."

The mistake commonly made with reference to the use of fat food is, that it is only or especially applicable in cold climates—an erroneous inference, the same as that that cold is preventive of tuberculosis. That fat is the almost exclusive food in arctic regions is because other food is not obtainable, not because of the frigid climate. It is necessary food, though not in such excess, at all times and everywhere, to supply the potential energy required by the organism to construct the tissues and maintain the body, the temperature of the body being about the same in all climates. Fat does not stand alone in this regard, except under such extraordinary circumstances as those referred to. Carbohydrates of various kinds contribute to the same functions as fat under ordinary conditions, but they do not suffice to maintain the stamina of the organism to the highest degree anywhere without the assistance of, or being supplemented by, some kind of fat.

A correct appreciation of the benefit of fat food in the arctic regions serves as an index to its advantages under other conditions. It is not limited to blubber, "toodnoo" or oil, even among the Laplanders. It includes the solid portions of reindeer, seal and other meat. And this in its composition doubtless compares favourably with the choicest cuts of beef and mutton, which consist of from 20 to 30 per cent. of fat; or possibly with good bacon or ham, about 35 to 50 per cent. Good butter, it hardly need be said, is almost wholly fat—85 to 90 per cent.

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<sup>1</sup> *Farr's Bulletin*, No. 23, 1894.

Of approximate stamina and exemption from tuberculosis, it is not far-fetched to refer to the history of most of the North American Indians, before the cultivation of cereals was introduced by the white settlers. Their food was almost exclusively the fat game which they hunted and killed in such a manner as to retain the blood. Of the wonderful physical strength and endurance of those savages, the history of them furnishes many examples. And the earliest records of consumption among them are contemporary with the attempted methods of civilising them—inducing them to leave their tents and live in houses ; restricting their game supply and supplying them with farinaceous food. They have ceased to be a hardy race and tuberculosis is common among them. The Gauchos of the South American pampas who live almost exclusively upon fat animal food, are alike remarkable for their extraordinary stamina. The flesh-eating Mahometans of India are described by historians as being the most powerful, active-minded and hardy race of human beings in the world, presenting the widest possible contrast in physical development to the rice-eating and feeble Hindoos, of whom but few reach the age of 40.

A striking example of what appears to be the result of a change from an almost exclusive fat meat diet to one largely farinaceous, in relation with tuberculosis, is afforded by the history of the New Zealanders, who, until about fifty years ago, were cannibals, eating their captives in war, but who besides consumed an enormous amount of fat pork. Dogs also composed a part of their dietary, and fish to some extent. They were remarkable for their physical development and exemption from tubercular diseases. But soon after the introduction of the potato as a staple food, at about the time mentioned, scrofula and other forms of tuberculosis began to prevail among them, and have attained a degree of prevalence even greater than among the poorest people in Ireland, where the staple food is of the same kind, but beneficially supplemented to a considerable extent by the use of buttermilk.

Moreover, I have observed among people in the tropics,

as well as in temperate latitudes, that there is a marked difference in the health of persons, whose chief food is farinaceous, between those who but rarely eat anything else and are particularly feeble, lymphatic and scrofulous; and those who eat butter or oil with their rice and similar food, or supplement it with sardines in oil, or oil-dressed salads.

Recurring to what I have remarked on the superiority of meat that retains the blood as well as the fat, every epicure knows and every physician ought to know, that the meat of animals of every kind so killed as to retain the blood is more delicious than that of animals otherwise killed. It is also more digestible and more nutritious.

All fresh meat is more or less acid, and that from which the blood has been drained requires to be kept until alkalinity is induced by incipient decomposition before it becomes tender and digestible. On the contrary, that which retains the blood only requires thorough cooling before it is ready for cooking and is tender and digestible from the outset, because the alkalinity of the blood speedily acts upon and neutralises the acid. Hence the meat of the buffalo, as it used to be killed and prepared by the North American Indians; the jerked beef of the Gauchos; the beef of cattle that have been knocked in the head, or preferably, by dividing the spinal marrow in the neck, as now practised in the abattoirs of Chicago (if it is not afterward drained of its blood), is greatly superior to that which is prepared after the method of the Jews. Besides, the draining or soaking away the blood from meat impairs its nutritive value. The blood is essentially of the same composition as the flesh, but besides, it holds in solution phosphates of soda, salts of potash, iron and sulphates; all nutritives of vital importance to the human economy. But there is no method of slaughtering animals that entirely divests the flesh of blood, hence to attempt to prohibit eating it to be effective should prohibit the eating of meat altogether.

While this note was in process came a press announcement that "tuberculosis has increased more than 80 per cent. in certain districts of Norway within the last thirty years, and

this despite the invigorating cold of the Norwegian clime and the hardy physique of the Norwegian people. Statistics also show a steady gain in the number of deaths from consumption in Sweden, Russia and northern countries generally."

If there is truth in this publication, it will or may be accounted for, I think, by too exclusive use of farinaceous foods.

Relative exemption from tuberculosis, under all circumstances, is, according to my observation, due to the generous use and potentiality of fat food.

My conclusion in this regard is fortified by many years' observation and study of the liability to consumption of peoples collectively, families and individuals, more or less proportional to their abstinence from fat foods: the most prominent example of whom I have never lost sight of from my youth up—the negro race in America.

I began my professional life among them when they were slaves and were always supplied with an abundance of "hog and hominy," not by any means restricted to these articles, but pork or bacon was a standing portion of at least one daily meal. Consumption among them was relatively rare.

My observation in this respect was not singular but in accord with all other medical observers of the time of whom I have knowledge. Conversely, it seems hardly necessary to invite attention to the prevalence of consumption among the same people now, under their changed conditions with regard to diet. "Hog," at least, is notable by its absence from the daily fare of most of them and no other fat meat has taken its place, and consumption among them is more than twice as great as it was formerly.

The same observation extends to smaller communities, families and individuals. Consumption is most prevalent among those who are stinted or who stint themselves of "bacon" and "butter." I mention these as ideal and, as before remarked, because they are the most digestible of fat foods; other fat foods are commendable.

Everybody has learned, when it is unfortunately, in most cases, too late, that cod-liver oil is good for consumptives, but

few seem to have learned that food of the same character as cod-liver oil, suitable for the table, is preventive of consumption.

In the whole course of my professional observation, now covering a period of nearly sixty years, I have known but rarely a family or an individual that was brought up on a liberal supply of butter and bacon who became tuberculous. Moreover, such food fortifies the system against other diseases as well as consumption ; it establishes stamina.

## SOME THOUGHTS ON THE NERVOUS SYSTEM IN PULMONARY PHTHISIS AS A BASIS FOR TREAT- MENT.

BY THOMAS J. MAYS, A.M., M.D.

PHILADELPHIA.

IF one fact is more apparent than another it is that pulmonary phthisis is neither primarily nor throughout its course a disease of the lungs exclusively. More correctly defined, it is an exhaustion of the vital forces of the body in which loss of appetite, fever, night sweats, quick pulse and respiration, loss of flesh, tiredness, sleeplessness and nervousness either accompany or precede the earliest implication of the pulmonary organs. If pulmonary phthisis is not essentially a disease of the lungs, what texture of the body is primarily at fault? From as conscientious and careful a study as I have been able to give to this subject, I believe that the original trouble in the great majority of cases lies in the brain and nervous system, and particularly in the pneumo-gastric nerves. These nerves, besides supplying the lungs, innervate the external ear and tympanum, pharynx, uvula and soft palate, cesophagus, larynx, heart, stomach, intestines, liver, spleen, kidneys and supra-renal capsules—all organs of the most vital import to the human economy. The chief function of these nerves is that of establishing a close and intimate relationship between these organs, and, indeed, it may be said that this influence extends over the growth and repair of every texture, for Gaskill holds that the sympathetic nerves are in large part but a continuation of the vagi.

Now, it will be admitted as a fundamental fact, I think, that if, from any cause, a nerve supplying an organ, or a number of organs, becomes impaired, the integrity of the latter suffer both in function and in structure. That the vagi are thus primarily involved in phthisis I have shown in rather a large collection of cases in which the confirmation was made by *post-mortem* examination. These cases demonstrate (1) that phthisis follows the pressure of tumours or of aneurism

on these nerves ; (2) that diseases of the brain and nervous system, as insanity, idiocy, epilepsy, asthma, hysteria, diabetes, locomotor ataxia, &c., are, in the majority of such cases, followed by phthisis in which the vagi are frequently involved ; and (3) that poisons of the brain and nervous system, like alcohol, syphilis, mercury, lead, typhoid fever, diphtheria, whooping cough, &c., are frequently causative of phthisis, or of some other form of pulmonary disintegration in which the vagi are implicated. From these facts we may therefore conclude that any condition, or agent, or influence that seriously impairs the vitality of the brain or nervous system also impairs the integrity of the vagi and leads to phthisis or of some other form of lung disorder. On the score of this hypothesis we can account for the many important organs which are simultaneously involved in this disease ; why there is ear disease, such as pain and perforation ; why there is pain along the course of one or both vagi in the region of the neck ; why there are pharyngitis, laryngitis, rapid heart action, indigestion, intestinal derangements, diseases of the liver, kidney, spleen, &c.

Believing, therefore, that a rational therapeutics of pulmonary phthisis naturally rests on a nervous pathology in the large majority of those we meet in daily practice, I have for a number of years discarded creasote, guaiacol, benzozol, iodoform, ichthyol, thymol, rectal injections of sulphuretted hydrogen, and injections of other gases and serums from my armamentarium, and have employed measures which make a strong stimulating appeal to the nervous system. Among these are strychnine, static electricity, quinine, capsicum, &c., and more recently I began giving attention to the local treatment of the vagi in the neck, first by massaging and kneading them through the overlying texture, which, although insufficient, I found a benefit to the cough and expectoration ; and second, by engendering a certain amount of counter-irritation along their course by the subcutaneous introduction of a small amount of silver nitrate (5 mm. of a  $2\frac{1}{2}$  per cent. solution) preceded by a similar dose of a cocaine solution—the latter being used for the purpose of obviating the pain

which would be occasioned by the former. The point selected for the introduction of these agents is immediately over or slightly behind the pulsating carotid artery in the neck between the angle of the lower jaw and the clavicle. It is important to lift the skin between the thumb and forefinger of the left hand and introduce the needle just through the skin. After the cocaine solution is injected, detach the syringe from the needle and let the latter remain in the puncture. Wash out the syringe with water, draw the silver solution into the syringe, attach the latter to the needle and throw in the required amount. As a rule, the first injection should be given on the side of the neck on which the affected lung is located. In a week or ten days this is to be repeated on the opposite side unless the original or previous injection is followed by too much irritation. Some cases do well when an injection is given on each side at the same time. They should be given every week or ten days, and, so far as my records show, thirty was the highest number of injections I gave to one patient.

The local visible effects of the injections show themselves in nodular, sometimes in diffuse, swellings, and in redness and pain, but in no instance have these conditions become extremely pronounced. Small abscesses occur occasionally, but on the whole I think they are not harmful, and may be of benefit, inasmuch as they prolong the desired counter-irritation.

During the last nineteen months I have used the silver-nitrate injections in about two hundred cases of phthisis,<sup>1</sup> and the following deductions show their influences on the various clinical symptoms of this disease :—

*Cough and Expectoration.*—These injections were originally undertaken solely with a view of relieving the cough and

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<sup>1</sup> (1) *Incipient* cases with beginning physical signs, some emaciation, cough, expectoration.

(2) *Advanced* cases without excavation, but with emaciation, cough, expectoration, &c.

(3) *Far Advanced*: excavation, with marked emaciation, cough, expectoration, &c.

expectoration, and there was no disappointment in this respect, for with but few exceptions these symptoms improved in a striking manner, and in some instances they ceased almost entirely after the first few injections. This was obtained chiefly among incipient and advanced cases, but was not without effect even in the far advanced cases. Besides their influence on the cough and expectoration they also ameliorated dyspnoea and oppression of the chest, this probably being well brought out in the alleviation which they give to the symptoms of asthma.

*Vomiting.*—Vomiting, which is one of the most annoying features of phthisis, was frequently relieved.

*Appetite.*—In the incipient and advanced cases the appetite, as a rule, is increased, and sometimes to a remarkable degree. This was also true in some of the far advanced instances.

*General Strength.*—An improvement of bodily strength was noticed in most of the cases. Whether this was due to an increased power of eating or to some other influence is not easy to say, but the fact forced itself too often on one's attention to escape notice.

*Physical Signs.*—In many of the incipient, in some of the advanced, and in a few of the far advanced cases a marked improvement occurred in the physical signs.

*Fever.*—A decline in temperature frequently occurred in those cases in which the temperature could be taken regularly.

*Night Sweats and Chills.*—In a number of cases these symptoms abated.

*Weight.*—One of the most surprising results of this treatment was the increase of weight which occurred in many of the cases. This was not due to any other influences, for in my early experiments with this method I gave either no medicine or a placebo, and maintained the same conditions in regard to food, &c., during the treatment as those which existed before it. While the gain was principally confined to incipient and advanced cases, it was also seen to some extent in the far advanced cases. Among those who gained the following are good examples : One patient gained 5 lbs. the

first week after the injections were begun, 6 lbs. the second, 4 lbs. the third, and 3 lbs. the fourth week. Another one lost 1 lb. in two days immediately preceding the first injection, gained 1 lb. first week after injection, 4 lbs. second week, 3 lbs. the third week, and 4 lbs. the fourth week. Another one lost 3 lbs. in five days immediately preceding the first injection, gained 2 lbs. during first week, 3 lbs. the second week, 2 lbs. the third week, and 4 lbs. the fourth week. Another lost 1 lb. in the week previous to first injection, gained 3 lbs. during week following, 4 lbs. in second week, and 2 lbs. in third week. Another gained 7 lbs. in six days after first injection, 3 lbs. in second week, and 2 lbs. the third week.

In conclusion, I believe that if this auxiliary method is combined with other good hygienic, dietetic, and medicinal treatment, the practical results will be greater than those represented above. Moreover, it seems to enforce on our attention the fact that the nervous system is the principal avenue through which pulmonary phthisis may be successfully approached from a therapeutic standpoint.

## Reviews and Notices of Books.

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A CONTRIBUTION TO THE STUDY OF THE BLOOD AND BLOOD-PRESSURE. By George Oliver, M.D.Lond., F.R.C.P.Lond., &c. (London: H. K. Lewis, 1901.)

The magnitude of Dr. Oliver's work is evident from the fact that it is founded upon no fewer than forty thousand observations on the blood, blood pressure, and calibre of the blood-vessels; only those who have attempted work of this kind can realise what this means and what patience and care are needed to make the observations reliable. Our readers will best get a true idea of the scope of the work if we refer to some of the more important conclusions Dr. Oliver has arrived at.

Passive elevation of a limb causes a marked reduction in the blood corpuscles, because capillary pressure being lessened the exudation of plasma is correspondingly small. Local muscular contraction, on the other hand, causes an immediate rise in the proportion of chromocytes owing, in large measure at least, to the increased exudation of plasma thereby induced. Passive massage has a similar effect. Active general exercise acts in a similar way, but in this case there is a fall in the hæmoglobin value of the chromocytes, some of the hæmoglobin being destroyed; it is, however, regenerated after rest, and may reach a higher value than before the exercise—in short, exercise in healthy subjects stimulates the formation of hæmoglobin; but in bad cases of anæmia "it is more than likely that the destructive influence of exercise on the hæmoglobin will predominate." Hence the value of absolute rest in the treatment of anæmia.

Residence in high altitudes causes a rise in the number of the chromocytes and to a less extent in their hæmoglobin value, effects which have been attributed to the dearth of oxygen at high altitudes; but Dr. Oliver brings forward evidence to show that it is really due to the low humidity which always obtains in elevated regions, and the resulting increased transpiration of water from the lungs and skin.

In the condition known as *spanæmia* the blood is subnormal in the volume of corpuscles, the proportion of hæmoglobin in individual corpuscles being normal; whether this condition is due to an actual diminution in the number of corpuscles, or to an excess of plasma, cannot be determined. *Spanæmia* is very common, especially in women, in many of whom it may be regarded as a normal condition.

In anæmia of the common or oligocythæmic type, there is a fall not only in the number of the corpuscles but in their

individual hæmoglobin value. Dr. Oliver has frequently detected anæmia even in florid subjects; we have ourselves recognised the possibility of this concurrence, as we have so frequently observed the beneficial effects of iron in patients presenting a florid appearance.

In polycythæmia the rise of chromocytes may exceed the normal by 20 per cent.; in such cases there is always a reduction in the hæmoglobin value of the corpuscles, though as a rule the actual reading of the hæmoglobin rises; but in some cases the condition is one of virtual anæmia characterised by an excess of chromocytes comparatively poor in hæmoglobin. "Usually those suffering from this type of anæmia are somewhat badly nourished and thin, and do not present the puffiness and obesity of chlorosis." In many of these cases there is reduced ingestion of water, and in some increased elimination, the blood being polycythæmic because there is a lessened proportion of water in it. The author has some important practical observations on this interesting condition.

Dr. Oliver points out that digital estimation of the arterial blood pressure, from examination of a small artery like the radial, is unreliable, owing chiefly to alterations in the calibre of the vessel, great reduction in calibre giving the impression to the finger of a marked fall in pressure. When it is sought to estimate pressure by the finger a large artery like the carotid should be chosen. The blood pressure, it is contended, can only be correctly estimated through a fluid medium, and to Dr. Oliver belongs the honour of being the first to devise an instrument to estimate blood pressure founded on this principle. By means of it he has been able to show that on the proximal side of the arterioles the blood pressure is practically uniform, a rapid fall occurring in the region of these vessels.

The primary effect of muscular exercise is to raise the mean arterial blood pressure owing to the increased output from the left ventricle and to a transference of blood from the splanchnic to the systemic vessels; this primary rise is followed by a decline in pressure (due to the diminution of vaso-motor tone), which may fall below the original pressure; especially is this the case when that pressure is high; hence the value of habitual exercise in those in whom arterial pressure is high from increased peripheral resistance.

The blood pressure may be as powerfully affected by intellectual activity and emotional excitement as by muscular action, and for similar reasons. This helps to explain why those who lead a life of great intellectual activity and emotional excitement are apt, like Dickens, to die from apoplexy: they wear out their blood-vessels.

Fatigue tends to diminish the blood pressure in the upright posture.

In all forms of effort the arterial and venous blood pressures are very markedly raised. Dr. Oliver's observations have led him to conclude—contrary to others—that the mean arterial pressure is raised, not lowered, by prolonged expiration with closed mouth and nostrils. Certainly the sudden, short expiration of cough raises arterial pressure, as we have ourselves repeatedly observed by feeling the radials and observing the temporal arteries, which swell up markedly during a sharp cough.

Resisted movements lower the mean arterial pressure by widening the peripheral bed in the muscles, while they do not as a rule incite the ventricle to increased or more frequent action. The extra quantity of blood in the muscles is diverted from the splanchnic veins and heart, and the author would also probably include the large veins. We would point out that in the simplest resisted movement a large number of muscles are thrown into gentle tonic contraction, which by squeezing the muscle-veins tends to keep down the outflow from the muscles. It may be questioned whether the heart is not at the same time gently stimulated, not to rapid and excited action, but to calm and deliberate systole; no drug we possess is in any way comparable to muscle exercise as a cardiac stimulant, and we would suggest that the beneficial effects of resisted movements are due to the transference of a large quantity of blood to the muscles, while at the same time the heart is stimulated and the outflow from them is kept comparatively low.

The effect of massage on the blood pressure depends upon the kind employed. Systematic massage (*pettrissage*) lowering the mean arterial and venous pressure, abdominal massage (kneading and compressive) having the opposite effect. Hence, as the author observes, due discrimination is necessary in prescribing massage, otherwise we may do more harm than good.

The author discusses at length the influence of the different kinds of baths on the blood pressure, drawing some important practical inferences.

The relation between increased peripheral resistance and dilated heart is pointed out, and attention is drawn to the fact that quite temporary dilatation may result from this cause, this phenomenon being more common in women than in men. We cordially endorse the following observation regarding these latter cases. "Percussion shows the enlarged area of the heart, but I have not relied entirely on percussion for the demonstration of the dilatation, because it does not appeal to all with equal force as a convincing method of proof. It seemed to me that everyone could, however, appreciate the exact position of the maximum spot of the apex beat in relation to a fixed part as a more reliable and definite sign than any

other to demonstrate the condition of the ventricle; I therefore trusted mainly to the site of the apex beat."

Among the diseases which cause increased peripheral resistance the author mentions irritable skin affections and obesity.

The last portion of the book treats of the important subject of overloading of the splanchnic area. This overloading is due to increased systemic resistance, to relaxation of the splanchnic arteries, or to a combination of each; the former being the predominant factor in chronic goutiness, and the latter in all forms of debility. Splanchnic drain, however induced, frequently causes a pale and quasi-anæmic appearance—a fact which we have ourselves observed—and if persistent favours hepatic derangement and chronic gastro-intestinal catarrh.

We have said enough to show the scope of Dr. Oliver's work. A close study of the book shows that the investigations have been undertaken with the greatest care, and that sound judgment has been exercised in the deductions drawn from them. Due recognition is given to the investigations of others, and the author advances his own views in the temperate spirit characteristic of the scientific mind. The book is a valuable addition to medical literature.

**CONSTIPATION AND SOME ASSOCIATED DISORDERS.** By Edward Blake, M.D. Second Edition. (London: Henry J. Glaisher, 1900.)

The subjects included in this volume are both many and varied. Dr. Blake has enjoyed a long experience and seems to have been a wide reader. During what he describes as "forty years of pelvic practice" he has accumulated numerous clinical observations, and has noted many practical and scientific references bearing more or less directly on his medical experiences. Under these circumstances it is both natural and praiseworthy that he should desire to enlighten his less experienced and less industrious brethren. Unfortunately, in spite of his literary studies, Dr. Blake has not acquired the art of systematic arrangement nor the virtue of concise and clear statement. The perusal of his book is, therefore, a very irritating discipline, in which the relationship of successive paragraphs to one another or to the section in which they are placed constitutes a puzzle often entirely beyond solution. Take, for example, a chapter marked "Hydropathy in Constipation." Instead, as one would expect, of a careful description of the several methods of using water in the treatment of constipation, we get a bare reference to this subject, and the chapter consists mainly of disjointed and rambling notes

on colon diagnosis, intestinal spasm, dilated stomach, atony of the abdominal wall, brain and spinal cord, &c., &c. What these have to do with hydropathy in constipation we are at a loss to discover. Another chapter is named "Portal Congestion and the Systemic Veins." It is entirely free from any discussion of the subject of portal congestion, and does not contain a single word explaining why the two terms are printed together at the head of the chapter. When we meet with two other titles in which "Portal Congestion" appears, we begin to think that possibly it is as difficult for Dr. Blake to keep this phrase out of his manuscript as it was for Mr. Dick to exclude the head of King Charles from the paragraphs of his famous memorial. The chapter named "Portal Congestion; its Treatment," occupying as it does but a couple of pages, has certainly the merit of brevity, but its praise cannot be further extended. With the exception of one or two general statements of doubtful accuracy at the beginning, and a portentous announcement of the wonders to be revealed in the later part of the book at the end, this chapter consists of what Dr. Blake calls "some leading indications for selection" from among the "more orthodox remedies." We quote a few of these leading indications: "if frontal headache, *bryonia* or *iridin*; *bryonia* is also indicated by anuria; if occipital headache, *sanguinarin*; if temporal headache, *St. Ignatius' bean*: occipito-frontal headache with gastralgia or nausea, *nux vomica*. . . . Constipation with gleet suggests *hydrastin*. For relaxed sore throat, piles and cramp of gouty men, *nux vomica* is invaluable; if it fail, we can fall back upon *æsculus* and on *mercurials*. . . . For congested piles, especially in women, *collinsonia* has proved of signal service." The connection between such symptoms as anuria and gleet on the one hand, and portal congestion on the other, Dr. Blake does not explain. Nor does he inform us what he means by an "orthodox remedy." His favourites appear to be taken from a certain type of family medicine chest, and may, for aught we know, have some measure of value. But to secure their general adoption something more we think will be needed than the favour of Dr. Blake's pontifical benediction.

Dr. Blake's literary style is a somewhat curious and, to us at least, an unhappy one. He has a perfect passion for grandiloquent phrases. The psychology of constipation, psychic constipation, mental constipation, neurotoxis of the vagus, cerebral coprostasis, are indeed well calculated to make the flesh of the unwary to creep, but practically they are as harmless as the old lady's "Mesopotamia." To some extent, no doubt, the question is one of taste, but if we wished a good example of pompous pedantry in medical literature we should select the sentence in which we are told that "with

constipation comes *autotoxis coprostatica*, and one of its most serious results is an arrest of hæmatopoiesis." It sounds like an echo from the middle ages. In his preface Dr. Blake informs us that "as we tread the thorny Path of Progress, many cherished beliefs have to be abandoned, as tired children fling away the dead flowers that have cost them so much to gather!" Whether tired children are, or are not, in the habit of gathering dead flowers we cannot say, but we fully recognise the difficulty of maintaining this style of writing through chapters dealing with such prosaic subjects as fæcal retention and the treatment of piles. For our own part, we wish Dr. Blake had flung his dead phrases after the children's flowers.

One other aspect of the book demands a word of comment. In the course of his reading Dr. Blake has been introduced to some of the physiological problems of intestinal innervation, and has acquired the conviction that he is competent to state these problems, or even to aid in their solution. But for such a task, as his early chapters show, he is quite unequal. Pelvic practice may fit a man to deal successfully with a fistula in ano, or to remove "historic concretions" from the rectum, but the physiology of the nervous system demands for its discussion another school of training. Mrs. Partington could boast her triumphs, but failed completely when she attempted to brush back the Atlantic Ocean—"she was excellent at a slop or a puddle, but she should never have meddled with a tempest."

Had Dr. Blake been content to relate in plain and unaffected language the practical lessons he has learned in his experiences of the region below the plane of the pelvic brim, he might possibly have told us one or two things worth knowing. But though he is not unfamiliar with Latin tags, he has forgotten the warning phrase, *Ne sutor ultra crepidam*.

**A SYSTEM OF PHYSIOLOGIC THERAPEUTICS.** A practical exposition of the methods, other than drug giving, useful in the prevention of disease and in the treatment of the sick. By various authors. Edited by Solomon Solis Cohen, A.M., M.D., Professor of Medicine and Therapeutics in the Philadelphia Polyclinic, &c., &c. (London: Rebman, Limited, 129, Shaftesbury Avenue, 1901.)

The scope of this work, indicated in the sub-title, is fully explained by the Editor in an excellent foreword. "By natural or physiologic therapeutics is meant the utilisation in the management of the sick of agencies similar to those acting upon the human body in health, but because of some departure from health, needing to be specially exaggerated or localised in their action." The means of treatment thus comprised are to be included in eleven volumes of convenient size

and shape, of which three have already appeared. The first two treat of electrotherapy in the very masterly manner to be expected from their author, Dr. George Jacoby of New York. Nothing could be more lucid than his general introduction to the subject, or more satisfactory than the exhaustive references to the various methods in which electricity is used as a remedial agent.

The third volume, dealing with climatology and the description of health resorts, is the work of Dr. Parkes Weber, who will also be responsible for volume four, dealing with mineral springs. We shall take an opportunity in a subsequent number of referring to the contributions of this author and to those of others whose subjects especially concern us, so that we must content ourselves with saying here that the third volume well sustains the great reputation in matters climatological that we are accustomed to associate with the name of Weber, and that we await with interest the appearance of the book which will enable us to estimate his completed work. The remaining volumes will include the following : Prophylaxis, Personal Hygiene, &c., by Drs. Harold Ernst and Albert Abrams ; Dietotherapy, by Dr. Nathan Davis, jun., of Chicago ; Mechanotherapy and Physical Exercise, by three writers ; Rest, Mental Therapeutics and Suggestion, by Dr. Francis Dercum of Philadelphia ; Hydrotherapy, Thermo-therapy, Phototherapy, Balneology, by Drs. Winternitz of Vienna and Kisch of Prague ; Pneumatotherapy, Organotherapy, &c., by various writers.

As will be seen from this enumeration, these subjects are all of them in a large measure related to one another, and to the practice of Climatology, Balneology and allied methods. They cannot therefore fail to be of quite unusual interest to readers of the *Journal*. If the volumes already issued afford any criterion of the quality of those which are to come, the latter will be satisfactory to the most exacting, and the whole series will constitute a work of reference which it will be very inconvenient to be without.

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## Notes from the Spas and Sea-side Stations.

### ILFRACOMBE.

THE climate is equable, moderately bracing and compared with other towns where temperatures, &c., are recorded, is found to be warmer in winter and cooler in summer ; this may be accounted for by its sea coast, and the influence of the Gulf Stream. The subsoil is composed of strata of porous shale placed at varying angles to the horizon and forming a natural means of drainage for all surface water, which rapidly percolates.

From statistics compiled by Mr. Francis Campbell Bayard for the Royal Meteorological Society, and published in their Journal, it would appear that the mean minimum temperature of Ilfracombe ranks second as compared with other resorts where records are kept. The average winter temperature for the seven years ending 1898 was 44·9°. That of the summer 57°; the main daily range being 8·4°. The latter point is important in indicating the climatic condition and amount of cold experienced. Ilfracombe comes first in degrees of mildness as compared with Teignmouth, Babbacombe, Ventnor, &c. The average humidity for the year is 85·7°. The rainfall 30·63 inches.

There are no special mineral waters, but there are excellent sea water and swimming baths, usually warmed. The winter climate is very favourable to bronchitis and chest complaints in general. The death rate averages 12·7 per thousand. The health of the town is generally good. Zymotic diseases are very few, averaging ·5 per thousand. The authorities issue sanitary certificates, and the town refuse is removed outside the town and burned.

The hotel and boarding house accommodation is excellent, and there are plenty of well managed lodging houses.

The attractions are numerous, including a good band which plays daily on the pavilion ; a great variety of coaching

trips, daily sea trips in steamers and pleasure boats ; and concerts every evening throughout the season.

The population varies from eight to twenty-four thousand, according to season. The water supply is good, and will shortly be increased at a great expense by additional supply brought direct from Exmoor.

The train service is very fair, being supplied by the G.W.R., and the L. & S.W.Ry.

The coast abounds in small coves where good bathing can be had. The town is sheltered by tors and headlands from which splendid sea and inland views can be obtained. For the invalid the valleys afford sheltered walks, with seats placed at intervals for their convenience. Donkey chairs are numerous and may be hired at a moderate price.

#### LEAMINGTON.

Fashion is everything nowadays, and Bath, Harrogate and Buxton have for a long period taken the lead as inland watering places, and the benefits resulting from residence and treatment at those places are generally admitted. As every one knows, Leamington enjoyed at one time an equal reputation, but for many years past it has dropped somewhat into the shade as a health resort. The reason was that nearly the whole system of management of the baths was somewhat antiquated, but this has all been changed, as the Pump Room Committee, anxious to put everything upon a satisfactory footing, recently appointed a new staff, under an experienced manager (from the Royal Mineral Water Hospital, Bath), and under his excellent management, aided by his wife as matron (who is also thoroughly well trained), all the newest improvements have been introduced at the Pump Room, and now patients are being sent here in increasing numbers from all parts of England, and a very great many from America. The Americans are credited with being the most up-to-date people of our time, and as they do not take their pleasures sadly, and generally have ample means for gratifying their desires, it is flattering to Leamington that such a large number of them patronise the place, and that American doctors send a great many cases for treatment at the baths.

Leamington has an elevation of 195 feet above sea level.

The geological formation is new red sandstone.

The humidity and rainfall are described by Mr. Barnett as under, for 1900 :—

MONTH	Mean of Pressure	AIR TEMPERATURE							Relative Humidity.	RAINFALL	
		Means of		Absolute Maximum & Minimum						Total Fall	Number of Days
	9 a.m.	9 a.m.	Max.	Min.	Max.	Date	Min.	Date	9 a.m.		
	Inches	Degrees	Degrees	Degrees	Degrees		Degrees		PerC't.	Inches	
January ..	29.895	40.7	45.2	35.3	59.9	23rd	26.1	21st	86	2.653	21
February ..	29.513	37.1	42.8	32.0	56.0	23rd	16.2	8th	85	4.074	17
March .....	30.013	38.5	45.8	33.4	55.4	10th	26.0	17th	81	.583	9
April .....	29.966	47.1	58.7	39.3	74.9	21st	28.2	2nd	74	.902	14
May .....	29.955	49.5	60.8	43.7	67.5	27th	34.8	17th	83	1.265	10
June .....	29.914	56.1	68.4	51.1	82.9	11th	42.8	6th	75	2.872	17
July .....	29.982	63.4	76.7	56.3	90.1	19th	49.4	4th	71	1.133	12
August .....	29.955	58.3	70.4	53.2	82.1	14th	47.3	11th	77	3.645	14
September	30.114	56.4	67.6	49.0	78.3	6th	30.0	20th	81	.550	5
October .....	29.945	49.7	53.7	43.8	60.9	9th	32.6	22nd	83	2.035	18
November	29.726	45.8	50.6	41.9	59.9	1st	30.8	11th	86	1.628	17
December	29.874	45.9	49.9	40.6	56.5	20th	24.0	23rd	86	4.649	19
Totals....	358.842	588.5	622.6	519.6	—	—	—	—	968	25.989	173
Means ..	29.904	49.0	57.5	43.3	—	—	—	—	81	2.166	14

The climate is equable—warm in summer and warm in winter.

The special means of treatment are by mineral waters, both for bathing and drinking.

The Dowsing radiant heat and light baths. The "Aix" douche (administered by experienced masseurs and masseuses). The hot carbonated brine bath (Thermal Soölbader) is a great feature of the spa, and Schott's exercises are given by the manager and matron. There are reclining baths, deep immersion—with lift, crane and chair for cripples, or invalids unable to walk—needle, vapour and shower baths; pine, sulphur and other medicated baths; local and special baths for internal complaints; special douches, ascending and descending, and wave baths. The Vichy douche is nearly completed. There are two very capacious swimming baths, supplied with soft, filtered water.

At "Northwood," in Binswood Avenue, there is a most excellent nursing home, which is managed by two sisters from St. Mary's Hospital, and all forms of treatment are carried out there. One of the sisters has worked under Weir-Mitchell, and the other has "served her apprenticeship" at Nauheim, and attends outside patients as well.

The manager and matron at the Pump Room are also allowed to take cases in their private time.

The season for bathing and water-drinking is put down as from April to October, but on account of the equable climate patients take the waters all the year round, with equal benefit and perfect safety. The "social season" is from November to end of April, and thus coincides with the hunting season.

The death-rate for 1900 was 15·8. The average death-rate for many years past has been about 15·4. The zymotic death is, and always has been, very low, last year only 0·3 per thousand.

The population is about 29,000.

There are two lines of railway—the Great Western and the London and North Western, each with a splendid service of trains.

The water supply is plentiful and comes from an Artesian Well at Campion Hill, and this is supplemented by a new well recently sunk at Lillington. All the analyses prove the water to be of most excellent quality.

The town sewage is pumped up to Lord Warwick's farm at Heathcote, and the general system of drainage in the borough is excellent. The general condition of house sanitation is remarkably good, and the hotels and lodging-houses are of exceptionally high character, and good cooking is the rule. Most of these possess sanitary certificates, but these are obtained at their own expense. The Medical Officer of Health, with a good staff of sanitary inspectors, is very indefatigable in his duties. Refuse is efficiently disposed of by a new refuse destructor.

The past season has been good and the present one shows a decided increase in visitors of a good class. The same people return again and again.

The amusements are of a very high order. In the spring and summer there are daily concerts in the pretty Pump Room Gardens, and also in the charming Jephson Gardens. Illuminated concerts are given once a week, and frequent fire-work displays are given, principally by Brock. Recently, concerts by the Guards, and other leading military bands

have been organised—each band being engaged for a week—and these are largely patronised. In the winter and at Easter the Blue Viennese Band has been engaged at the winter halls, and other afternoon and evening concerts take place at the Town Hall, &c. There is an excellent theatre, at which high class companies appear. We have the Warwickshire Polo Club here, and several golf clubs, boating, fishing, cricket, &c. The North Warwickshire and the Warwickshire Hounds meet in the immediate neighbourhood, and the Atherstone, Pytchley, Bicester and Heythrop packs are easily accessible.

Warwick, Guy's Cliffe, Kenilworth, Stratford and Coventry are within easy distances.

Leamington has a wide reputation for its excellent schools.

There is, of course, no need for me to mention the forms of diseases for which the above-mentioned baths are suitable as remedial or curative agents; and as regards the composition of the Leamington Spa waters, I need only append the following report by Dr. Bostock Hill :—

	Grains		Grains		Grains		Grains
Sodium ...	34·38	Calcium ...	6·97	Sulphuric Acid ...	25·30	Silica ...	0·13
Magnesium ...	2·23	Chlorine ...	53·10	Oxide of Iron ...	0·14	Total ...	122·25

The mineral matters in solution are arranged to form the following combinations :—

Chlor. of Sodium.	Sulp. of Calcium.	Chlor. of Calcium.	Sulp. of Sodium.
Sulp. of Magnesium.	Chlor. of Magnesium.	Carb. of Calcium.	Carb. of Iron.

(The above quantities expressed in grains per pint of water, represent the yield of the saline residue after evaporation).

Ammonia estimated in parts per 100,000 of the water. Ammonia (Saline) = 0·280. Ammonia (Organic) = 0·004. Nitrogen (as Nitrite and Nitrate) = 0·22. The free and Saline Ammonia and Nitrogen as Nitrate, are here added, as evidencing the organic purity of the water.

#### MALVERN.

The publication in each number of the JOURNAL OF BALNEOLOGY AND CLIMATOLOGY of notes from the various watering places in the United Kingdom will undoubtedly prove

of great value, for it will allow medical men almost at a glance to obtain the information they require, when considering where to send patients for various ailments. My notes shall be brief and in as compact a form as possible.

The main thoroughfare through Malvern is at an elevation of 500 feet above the sea level, the town lying on the eastern side of the hills which run almost directly north and south.

The relative humidity of the atmosphere for nine years has averaged 81.

The rainfall for the same period averaged 25.82 inches. The climate is equable, with a mean annual temperature of 49.58, and a mean daily range averaging about 12.5 degrees.

Amount of sunshine not registered, on account of the position of the town on eastern slope of the hills.

The special means of treatment are by brine baths at the Imperial Hotel (the brine being brought from Droitwich), and also baths of various kinds here, and at the Hydropathic Establishment, Nauheim and Aix massage being included.

The season when Malvern is most full is during the months of July, August and September, but it is frequented at all periods of the year.

The death rate averages 12.2 per thousand. The population of Great Malvern is between 8,000 and 9,000, increased during the summer months to between 11,000 and 12,000. The whole of the Malverns (six in number) are now amalgamated, and under one governing body, the Malvern Urban District Council, and the combined population numbers 16,400.

Malvern is on the Great Western Railway, within three hours of London by through express from Paddington.

The water supply is abundant, and exceptionally pure; it is collected along the eastern side of the Malvern Hills by means of intercepting catch waters led along the face of the hills and conveyed by pipes to the reservoir, which lies immediately below the summit of the Herefordshire Beacon. The area of the reservoir is about seven acres, the capacity more than forty-four million gallons, and the top water level 672 feet above the sea level. From there the water passes through filtering beds, and is then conducted through 15 inch cast

iron pipes to Great Malvern, supplying Malvern Wells on its passage through the village.

West Malvern has a special supply of its own, derived from a reservoir on the western side of the hills. The public sewers have been relaid in the last few years on the latest principles. House sanitation is excellent. Sanitary certificates given by Council, if up to the high standard required; hotels and lodging-houses almost without exception have obtained them. Refuse efficiently disposed of; sanitary boxes are used and emptied two or three times weekly; no ash-pits allowed.

A new infectious hospital with private wards has recently been opened. It is one and a-half miles from the town and connected by telephone.

The season of last year was good and Malvern is now filling well. The Gentlemen's Club is good and central. There is a golf club with an excellent course, cricket club, lawn tennis and croquet club.

#### SIDMOUTH.

Sidmouth is situated at the mouth of a valley six miles long by about two broad, on what was once the gravelly bed of a river. The hills forming the boundaries of the valley are from 500 to 800 feet in height and form a natural windscreen from the north, east and west. Mean humidity =  $83^{\circ}$ , saturation point being  $100^{\circ}$ . Average rainfall for the years 1871-90, 33.68 inches. The climate is remarkable for its equability, being comparatively cool in summer and warm in winter. This fact is due to the proximity of the sea and the shelter from cold winds supplied by the surrounding hills. With regard to sunshine Sidmouth is blessed with more than the average of south coast places. In the six winter months from 1890 to 1893, when the Jordan Photographic Recorder was in use by Dr. George Oliver, the total number of hours of bright sunshine at Sidmouth were in 1891, 564 hours; 1892, 529 hours; 1893, 602 hours. As compared with these figures the average of the South Coast Meteorological Society Stations for the ten years 1880-1890 was 474 hours.

*Baths.*—Besides ordinary sea-bathing, the town has a very

complete bath establishment fitted up with all the most modern appliances for hot and cold, fresh and salt water immersion, Aix massage and other baths. The Nauheim baths are given in sea-water with chemically produced effervescence. The male and female attendants are well accustomed to give Schott movements and massage. Many patients attend from all parts of the United Kingdom for Nauheim and other bath treatment in the winter months, when most health resorts are deserted.

*Seasons.*—Sidmouth is most popular in the summer holiday season, *i.e.*, July to October, and in the heart of the winter, December to March. Owing to the equable climate and comparatively abundant sunshine, the sheltered valley is becoming increasingly popular as a winter and early spring health resort.

*Death-rate* for the ostenniel period 1892-1899, including visitors, 15.9 per 1,000 ; excluding visitors, 13.24 per 1,000.

*Population.*—About 4,100.

*Railway.*—By the L. & S. W. R., Sidmouth is about four and a-half hours from London.

The town is governed by the Urban District Council.

The water supply is abundant and of the purest. It is derived from springs in the hills far away from human habitations, distant one and four miles from the town, at an altitude from 100 feet to 400 feet above the sea level. The water is almost entirely free from salts of lime.

A new sewerage system was laid down in 1897 under the superintendence of Mr. James Mansergh at a cost of over £10,000, and the sanitation is as perfect as modern science can make it. Sanitary certificates to hotels and lodging-houses are given by the local authorities at fixed intervals, after due inspection. During the last four years, with the exception of a few imported cases, the town has been quite free from all cases of notifiable disease. The disposition of the town refuse is satisfactory.

The amusements of the place are boating, fishing, cricket, lawn tennis, croquet and archery, all available for visitors. A nine-hole golf links is beautifully situated about one mile from the town. Numerous drives and excursions in the surround-

ing charming country supply a splendid field for the botanist, geologist, or entomologist.

There is a very complete social club facing the sea, with the usual amusements of whist, billiards, &c.

With the exception of the erection of the baths and club by a private company, and the expenditure on the new sewerage system by the Urban District Council, not much has been spent on public improvements, either by public or private enterprise. A pier and a harbour would be a great boon, but many of the residents desire to maintain the quiet and peaceful character and sylvan scenery of this healthy and somewhat secluded valley.

## NAMES OF TOWNS WHERE FELLOWS RESIDE.

### ENGLAND.

ASHBY-DE-LA-ZOUCH. — Williams,  
Chas. R.

#### BATH.

Bannatyne, Gilbert A.  
Bayliss, R. A.  
Begg, Chas.  
Benson, John R.  
Bowker, George.  
Cowan, Frederick.  
Ellis, W. McD.  
Fraser, Forbes.  
Kerr, J. G. Douglas.  
King, Preston.  
Lace, Frederick.  
Lowe, T. Pagan.  
Mackenzie, Alex. L.  
Symons, W. H.  
Walsh, Leslie H.  
Wigmore, J.  
Wohlmann, A.

#### BEXHILL-ON-SEA.

Joseph, A. H.  
Murdoch, Andrew.  
Wills, Joseph P. B.

BIRCHINGTON. — Harris, James S.

#### BIRMINGHAM.

Foster, Sir Walter (Hon.)

#### BLACKPOOL.

Kingsbury, Geo. C.  
Molloy, Leonard.  
Rhodes, T.

#### BOURNEMOUTH.

Gardner, T. F.  
Gardner, Wm. Thomas.  
Greves, E. Hyla.  
Harsant, Joseph George.  
Hosker, J.

Lys, Henry Crabham.

Mahomed, A. G. S.

Muspratt, Chas. Drummond.

Scott, Thos. B.

Snow, William V.

BRADFORD. — Campbell, Henry  
Johnstone.

#### BRIGHTON.

Dodd, Walter H.  
Furner, Willoughby.  
Goff, Bruce E.  
Griffin, Wm. Watson.  
Hobhouse, Edmund.  
Minter, Leonard J.  
Noble, Stanley.

BOGNOR. — Rawlinson, Frederick J.

BRIXHAM. — Elliott, George B.

BURGESS HILL. — Whitby, Chas.

BURNHAM. — Berry, Frederick  
Charles.

#### BUXTON.

Armstrong, Wm.  
Bennet, R. O. Gifford.  
Bennet, Chas. J.  
Braithwaite, John.  
Lorimer, George.  
Parker, R. Derident.  
Thompson, G. H.

CAMBRIDGE. — Allbutt, Professor  
Clifford (Hon.).

CAISTOR-ON-SEA. — Case, William

#### CHELTENHAM.

Cardew, G. A.  
Lawrence, H. Cripps.  
Pruen, Septimus Tristram.

CLACTON-ON-SEA. — Nourse, C. M.  
Stuart.

- CLIFTON.—Clarke, J. Michell.  
 CROMER.—Musgrave, C. B. Thos.  
 CROWBOROUGH.—Newell, Percy.  
 DEAL.—Lyddon, Richard.  
 DEVONPORT.—Hall, O.  
 DOVER.—Parsons, Charles.  
 DROITWICH.  
     Corbett, Thomas.  
     Cuthbertson, J. M.  
     Foulds, Francis Henry.  
     Jones, H. Shirley.  
     Roden, Percy A.  
     Wilkinson, John.  
 EASTBOURNE.  
     Barnes, Robert.  
     Daly, W. J.  
     Frost, E.  
     Habgood, Henry.  
     Macqueen, Thomas.  
     Plant, James Robert.  
 EXETER.—Kempe, A.  
 FALMOUTH.  
     Bullmore, W. King.  
     Knuthsen, L. F. M.  
     \*Young, Major L. Tarleton.  
 FELIXSTOWE.—Havell, C. G.  
 FINCHLEY.—Bangay, Richard.  
 FOLKESTONE.  
     Barrett, W. P.  
     Dodd, Percy.  
     Eastes, Thomas.  
     Larking, Arthur E.  
     Latter, Cecil.  
     Lewis, Percy George.  
     Tyson, W. J.  
     Wainwright, Lennox.  
 FRIMLEY GREEN (Surrey).  
     Haviland, Alfred.  
 GORLESTON. — Gilmour, Graham  
     Percy.  
 GRANGE-OVER-SANDS.  
     Beardsley, Amos.  
     Beardsley, Richard Henry.  
     Lowther, R.  
 GREAT YARMOUTH.—Moxon, A. H.  
 HARROGATE.  
     Bain, William.  
     Black, J. Gordon.  
     Gibson, Charles.  
     Hind, Harry.  
     Hobson, Lewis John.  
     Mouillot, F. A.  
     Myrtle, Andrew S.  
     Oliver, George.  
     Ozanne, Frederick N.  
     Smith, Francis W.  
     Solly, Ernest.  
     Walker, A. W. Hinsley.  
     Watson, W. M. Crawford.  
     Williams, Neville.  
 HASLEMERE.—Hutchinson, Roger  
     Jackson.  
 HASTINGS.  
     Allford, H. G. L.  
     Inglis, John.  
     Watson, George Trustram.  
 HERNE BAY. — Bowes, Charles  
     Keswick.  
 HODDESDON.—Love, William.  
 HOGSTHORPE.—Spilsbury, Francis  
     James.  
 HOYLAKE.—McAulay, Matthew.  
 HYPHE (Kent).—Hackney, John.  
 ILFORD.—Houchin, E. K.  
 ILFRACOMBE.  
     Gardner, J. Twiname.  
     Toller, C. W. E.  
 ILKLEY.  
     Bampton, A. H.  
     Bates, W. R.  
     Johnstone, Thomas.  
 LEAMINGTON.  
     Atkinson, Miles H. C.  
     Eardley-Wilmot, R.  
     Thursfield, Thos. W.  
     Wellesley-Garrett, A. S.  
     Wyer, Otho.  
 LEICESTER.  
     Dodd, John.  
     Pope, F. M.

LIMPLEY STOKE (Bath).—Drake,  
Thos. Geo.

LINCOLN.—Lowe, Geo. May.

LIVERPOOL. — Bickersteth,  
Edward Robert (Hon.).

LONDON.

Abraham, Phineas S.  
Achard, Alexander (Maryle-  
bone, W.).

Allen, W. Hamilton (Stanmore).

Ball, James Barry.

Baynes, Donald.

Bidwell, Leonard.

Blaker, Walter C.

Brown, F. Gordon.

Brown, George.

Bruce, J. Mitchell (Hon.).

Burnet, Robert William.

Campbell, Harry.

Cantlie, James.

Cathcart, George C.

Chaldecott, John Henry (Hamp-  
stead, N.W.).

Clarke, Ernest.

Clippingdale, S. D. (Kensing-  
ton).

Daniel, R. N. (S. Kensington).

Dockrell, Morgan.

Dodsworth, Frederick C. (Chis-  
wick).

Dowse, Thos. Stretch.

Ewart, William.

Fayrer, Sir Joseph, Bart. (Hon.).

Felkin, Robert William.

Forster, F. C.

Foster, Sir Walter (Hon.).

Fox, R. Fortescue (Winter).

Freyer, P. Johnston.

Gage-Brown, Charles Herbert  
(Belgravia, S.W.).

Garrod, Sir Alfred (Hon.).

Gordon, H. Laing (Honor Oak,  
S.E.).

Harbord, Augustus (Blooms-  
bury, W.C.).

Hawthorne, C. O.

Hedley, W. S.

Hill, G. W.

Hillyer, William H. (Streatham,  
S.W.).

Johnston, George F.

Jones, Montagu Handfield.

Keetley, C. R. B.

Kingscote, Ernest.

Knott, William (Oxford Circus,  
W.).

Lee, Robert (West Kensington).

Luff, Arthur Pearson.

Lyon, T. Glover (Victoria,  
S.W.).

Macfarlane, Alexander R. (Chel-  
sea, S.W.).

McCann, Frederick John.

McClure, Henry.

May, W. Page (May to Oct.).

Morison, Alexander.

Murray, J. Ivor.

Ord, W. Miller (Hon.).

Orwin, Arthur W.

Poore, Vivian (Hon.).

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